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ABSTRACT

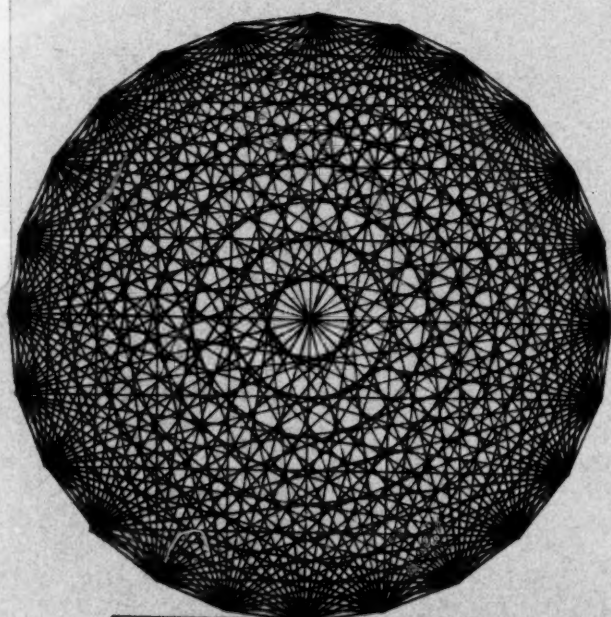
This document, the third in a series of three, contains the appendixes of a study designed to provide information for preparing a planning guide for drafting and design technology. Appendix A includes: (1) sample letters, (2) a questionnaire form, (3) statistical derivations, and (4) comparative topic ratings for the curriculum survey. Appendix B includes sample letters, and the director's copy of inventory form for the facilities survey. Appendix C includes: (1) sample letters and enclosures, (2) the survey questionnaire, and (3) subject rating summaries for the industrial survey. Planning forms are contained in Appendix D. Related documents are available as VT 014 406 and VT 014 407. (GEB)

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Appendixes

A GUIDE FOR PLANNING

Drafting and Design Technology Programs



1971

Prepared For

Division of Occupational Research and Development

Texas Education Agency

Austin, Texas 78701

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION

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VTG14408

A P P E N D I X E S

APPENDIX A--The Curriculum Study

Sample Letters

Sample Questionnaire

Statistical Formulas

Comparative Topic Rankings
by Schools and Industry

DRAFTING CURRICULUM STUDY

"A STUDY OF TEXAS JUNIOR COLLEGE DRAFTING TECHNOLOGY PROGRAMS"

Michael P. Guérard • Engineering Graphics Department • Texas A&M University • College Station, Texas 77843

SAMPLE REQUEST LETTER TO STATE EDUCATION AGENCIES

Gentlemen:

In cooperation with the Post Secondary Vocational Education Program Development Division of the Texas Education Agency, I am undertaking a study of Texas junior college drafting technology curricula for preparation of a planning guide in that discipline. It is possible that similar studies in (name of state) may have led to successful program guides in drafting technology or related areas.

I would appreciate receiving from you information on how I might obtain any of the following, in order of preference:

1. Copy of a state planning guide in drafting technology, junior college level.
2. Copy of a state planning guide in any technical area, junior college level.
3. Research papers leading to either of the above.
4. Additional reference material pertaining to the above.

If any of the above material is available through your office would you please forward it to me and bill me for any expenses that might be involved.

Sincerely,

Michael P. Guerard
Principal Investigator

MPG:rh

DRAFTING CURRICULUM STUDY

"A STUDY OF TEXAS JUNIOR COLLEGE DRAFTING TECHNOLOGY PROGRAMS"

Michael P. Guérard • Engineering Graphics Department • Texas A&M University • College Station, Texas 77843

SAMPLE INVITATION LETTER TO TEXAS JUNIOR COLLEGES

Dear _____:

In cooperation with the Texas Education Agency, I am undertaking a study of Texas junior college drafting technology curricula for preparation of a state planning guide in that discipline. The development of such a guide will depend a great deal upon information from junior colleges in Texas who have established programs in drafting technology. Since your institution falls into this category, I would like to invite your contribution to this study, an abstract of which is enclosed for your inspection.

Continued and frequent involvement on your part should not be necessary. It will consist mainly of filling out a questionnaire which I intend to structure in such a way that it will require minimal time to complete. Periodic reports of progress will be submitted to you for your inspection and comments, if you so desire.

I would appreciate receiving a reply at your early convenience and want to thank you for your consideration.

Sincerely,

Michael P. Guerard
Principal Investigator

MPG:rh
Encl

DRAFTING CURRICULUM STUDY

"A STUDY OF TEXAS JUNIOR COLLEGE DRAFTING TECHNOLOGY PROGRAMS"

Michael P. Guérard • Engineering Graphics Department • Texas A&M University • College Station, Texas 77843

SAMPLE INVITATION FOLLOW-UP LETTER TO TEXAS JUNIOR COLLEGES

Dear _____:

On (date of invitation letter) we sent you a letter of invitation to participate in a study being undertaken to analyze Texas junior college drafting technology curricula as one of the initial steps in preparing a state planning guide for that discipline. Your role in the study would be to respond to a questionnaire which will be distributed to participating schools within the next two weeks. In order to proceed with our study we need to know what you have decided. Will you please indicate your decision on the enclosed post card and return to us as soon as possible.

Sincerely,

Michael P. Guerard
Principal Investigator

MPG:rh
Encl

DRAFTING CURRICULUM STUDY

"A STUDY OF TEXAS JUNIOR COLLEGE DRAFTING TECHNOLOGY PROGRAMS"

Michael P. Guérard • Engineering Graphics Department • Texas A&M University • College Station, Texas 77843

SAMPLE LETTER OF THANKS FOR AGREEMENT TO PARTICIPATE

Dear _____:

Thank you for agreeing to assist me in my study of drafting technology curricula. I expect to have a questionnaire prepared shortly in which I will ask for your recommendations concerning program course content, sequence, credit value, etc. I would appreciate knowing if you or other members of your staff will be available for continuing correspondence during the summer of 1969.

Thank you again for your cooperation; I am looking forward to an interesting and productive association.

Sincerely,

Michael P. Guerard
Principal Investigator

MPG:rh

DRAFTING CURRICULUM STUDY

"A STUDY OF TEXAS JUNIOR COLLEGE DRAFTING TECHNOLOGY PROGRAMS"

Michael P. Guérard • Engineering Graphics Department • Texas A&M University • College Station, Texas 77843

SAMPLE PILOT STUDY LETTER

Dear _____:

The enclosures comprise a pilot study to test the appropriateness of my forthcoming questionnaire concerning drafting and design technology programs.

I would consider it a great service if you would complete the enclosed items, and return them to me at your earliest convenience, with your comments as to their suitability as typical questionnaire items.

Thank you for your cooperation.

Sincerely,

Michael P. Guerard
Principal Investigator

MPG:rh

DRAFTING CURRICULUM STUDY

"A STUDY OF TEXAS JUNIOR COLLEGE DRAFTING TECHNOLOGY PROGRAMS"

Michael P. Guérard • Engineering Graphics Department • Texas A&M University • College Station, Texas 77843

SAMPLE LETTER OF THANKS FOR PARTICIPATION

Dear _____:

I want to thank you for your prompt response to my questionnaire. I expect to have all the data compiled and tabulated in August or September of this year. Please check below and return this letter to me if you would like to have a copy of the results of the compilation.

Sincerely,

Michael P. Guerard
Principal Investigator

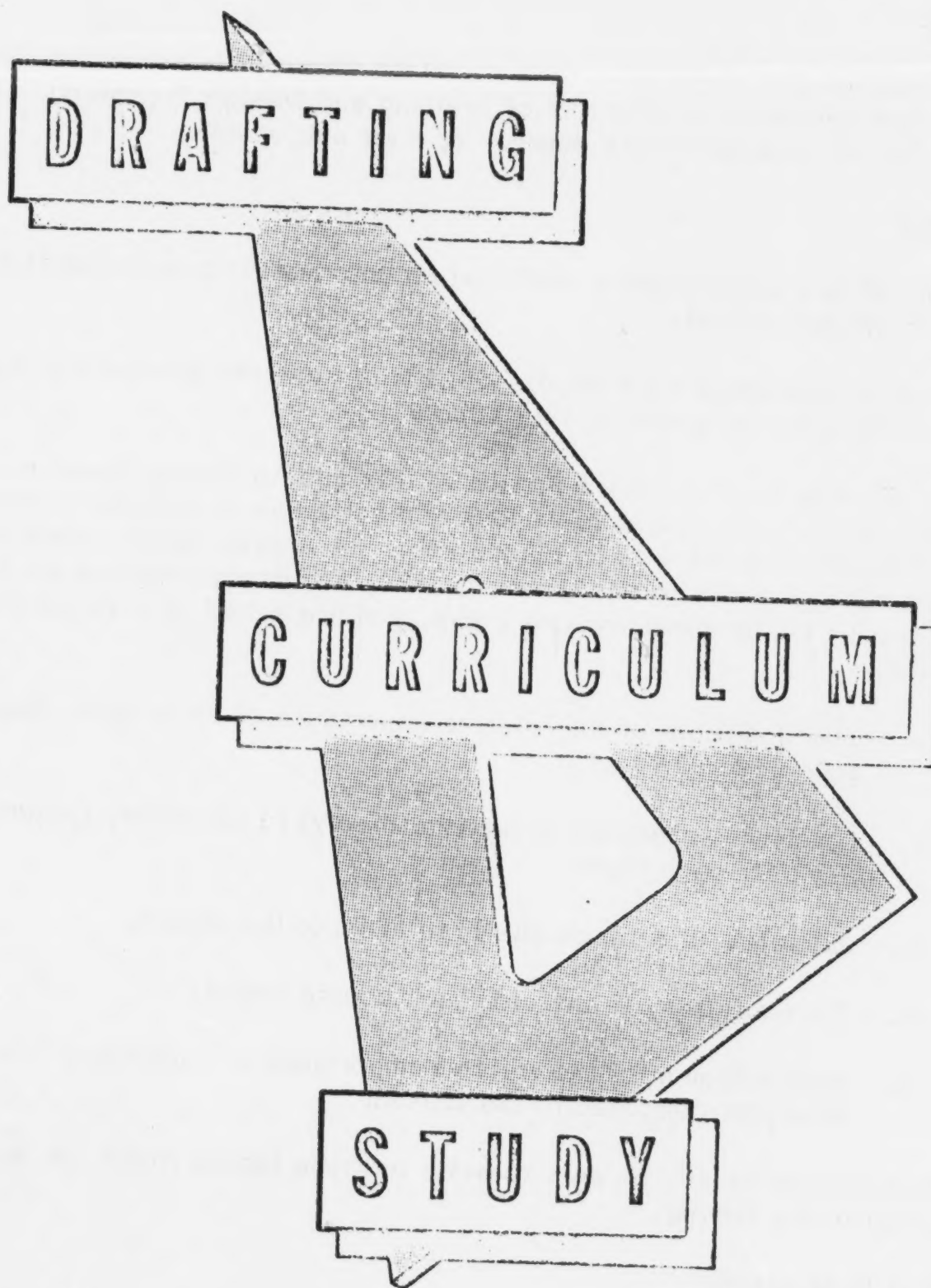
MPG:rh

____ Yes, I would like to receive a copy of the results.

Signed _____

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SAMPLE QUESTIONNAIRE



IN COOPERATION WITH: TEXAS EDUCATION AGENCY • IEAAS ENGINEERING EXPERIMENT STATION • ENGINEERING GRAPHICS DEPARTMENT, TEXAS A&M UNIVERSITY

MICHAEL P. GUÉRARD
ENGINEERING GRAPHICS DEPARTMENT
TEXAS A&M UNIVERSITY
COLLEGE STATION, TEXAS 77843

INTRODUCTION

Purpose:

The purpose of this questionnaire is to obtain information concerning course content and sequence in programs of Drafting and Design Technology studies leading to two-year associate degrees or their equivalent.

Structure:

Section I of this questionnaire asks you for information concerning the academic structure of your school.

Section II is concerned with the disposition of students leaving drafting and design technology programs at your school.

Section III, the most important portion of this questionnaire, consists of lists of topics likely to be taught in various subject areas of drafting technology. These subject areas have been placed under the course names taken from your school's catalog descriptions for the drafting and design technology program. In responding to the questionnaire items, you are asked to indicate the following:

- a. Your judgment of the relative importance of each topic, based upon time devoted to each.
- b. Relative percentage of lecture (theory) to laboratory (practice), if any, for each topic.
- c. Sequence of each course in relation to the others.
- d. Prerequisites, if any, for each course listed.
- e. Your judgment of the relative importance of each topic five years from now compared to the present.

For each course listed, be sure to write in those topics which are taught, but not given in the listing.

General Instructions:

Please follow the directions and examples carefully in order to help you make the correct responses. When you have completed the questionnaire, please return it in the enclosed self addressed envelope.

I. ACADEMIC STRUCTURE OF YOUR SCHOOL

Sessions:

Please indicate in the chart below the regular sessions into which your school year is divided. Indicate number of weeks per session to nearest whole number, not counting holidays. (Note example)

Session	YEAR AND MONTH												Number of Weeks						
	1968						1969												
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun		Jul	Aug	Sep	Oct	Nov	Dec
(EXAMPLE)			15				31												16
(A semester from Sep 15, 1968 to Jan 31, 1969 - 16 weeks, excluding holidays)																			
First																			
Second																			
Third																			
Fourth																			
1st Summer																			
2nd Summer																			

Enrollment & Staffing:

Current total school enrollment _____

Current enrollment in vocational-technical programs _____

Current enrollment in D & DT* programs _____

Number of regular instructors in D & DT* program _____

Average number of students taught by full-time instructor _____

*D & DT = Drafting & Design Technology

II. DISPOSITION OF STUDENTS LEAVING DRAFTING AND DESIGN TECHNOLOGY PROGRAMS

(Note: In responding to the following items please give the last figures available to you, or your best estimate.)

Percent of students entering D&DT program who
complete it successfully _____%

Year upon which this figure is based 19

Percent of successful completions who enter industry
as draftsmen/designers _____%

Year upon which this figure is based 19

Percent of successful completions who enter industry
in other than drafting/design capacities _____%

Year upon which this figure is based 19

Percent of successful completions who enter senior college _____%

Year upon which this figure is based 19

Percent of students dropping out of D&DT program who change to
another area of study, yet remain in your school _____%

Year upon which this figure is based 19

Percent of students dropping out of D&DT program who
leave school entirely _____%

Year upon which this figure is based 19

Disposition of students not classified above (please describe):

_____		_____%
_____		_____%
_____		_____%
_____		_____%

III. DRAFTING TECHNOLOGY COURSE CONTENT

Please refer to the example sheet on the next page.

The correctness of your responses will depend upon your understanding of the example and explanatory notes accompanying it.

THIS SAMPLE SHEET IS INTENDED TO DEMONSTRATE
THE PROCEDURE FOR COMPLETING THE ITEMS IN THIS
QUESTIONNAIRE. PLEASE REFER TO THE FOLLOWING
PAGE FOR EXPLANATORY NOTES.

498

COURSE: ENGR 103 - Descriptive Geometry

CODE: 011

	Topic	Relative Importance										Lec	Lab	Less	Equal	More	See Notes
		0	1	2	3	4	5	6	7	8	9	10					
1	Orthographic Projection											X	30	70		X	(a)
2	Views of Points, Lines, Planes									X			50	50		X	
3	Skew Lines	X														X	(b)
4	Piercing Points				X								40	60	X		
5	Plane Intersections							X					60	40		X	
6	Perpendicularity - Lines & Planes										X		50	50		X	
7	Dihedral Angles						X						50	50		X	(c)
8	Angle Between Line & Plane					X							30	70		X	
9	Revolution								X				50	50		X	
10	Intersection & Development			X									20	80		X	
11	Charts & Graphs									X			30	70		X	
12	Graphical Mathematics	X														X	
13	Vector Graphics							X					40	60		X	
14	Linkage Analysis				X								40	60		X	
15	Mining & Geology Problems								X				50	50	X		(d)
16	Topography & Mapping												60	40		X	
17	COMPUTER GRAPHICS			X									70	30		X	(e)
18	PICTORIALS									X			50	50		X	
19																	
20																	
21																	
22																	
23																	
24																	
25																	

This course is: ☒ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 ③ 4 5 6 7 8

Regular or summer session: ☒ regular ☐ summer

Enrollment and date when last taught: 25 students in 1968

Number of class hours per week: Lecture: 2 Laboratory: 4

Number of credit hours given for course: 4

Number and name of prerequisite course, if any: ENGINEERING 101

EXPLANATORY NOTES ON SAMPLE SHEET

- (a) Line 1 - Orthograph Projection, receives maximum emphasis, i.e., no other topic receives more emphasis. Thirty percent is devoted to lecture (theory) and seventy percent to laboratory (practice). Importance five years from now is expected to be about the same as it is now.
- (b) Line 3 - Skew Lines, and Line 12 - Graphical Mathematics, receive zero emphasis, i.e., are not taught in this course. Note that lecture:lab ratio is irrelevant in this case. Both topics are expected to receive more emphasis five years from now.
- (c) Line 7 - Dihedral Angles, receive considerably less emphasis than Orthographic Projection (Line 1), but slightly more emphasis than Angle Between Line & Plane (Line 8). Fifty percent is devoted to lecture, and fifty percent to laboratory practice. Importance five years from now is expected to be the same.
- (d) Line 15 - Mining & Geology Problems are expected to be less important in five years.
- (e) Line 17 - Computer Graphics, and Line 18 - Pictorials, have been added by the respondent since they are included in the course specified.

The remaining items below the chart should be self-explanatory.

COURSE:

CODE: 001

	Topic	Relative Importance											Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10					
1	Drawing Equipment & Instruments																
2	Freehand Lettering																
3	Standard Line Symbols																
4	Use of Scales																
5	Geometric Construction																
6	Multiview Drawing																
7	Primary Auxiliary Views																
8	Secondary Auxiliary Views																
9	Basic Dimensioning																
10	Isometric Drawing																
11	Oblique Drawing																
12	Perspective																
13	Sections & Conventions																
14	Threads & Fasteners																
15	Tolerancing																
16	Working Drawings																
17	Freehand Sketching																
18	Charts & Graphs																
19	Drawing Reproduction																
20	Intersection & Development																
21																	
22																	
23																	
24																	
25																	

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 002

	Topic	Relative Importance										Lect	Lab	Less	Total	Misc
		0	1	2	3	4	5	6	7	8	9	10				
1	Successive Auxiliary Views															
2	Threads & Fasteners															
3	Welding Drawing															
4	Shop Processes															
5	Detail Drawings															
6	Assembly Drawings															
7	Exploded Pictorials															
8	Drafting Room Practices															
9	Drawing Reproduction															
10	Gears, Pulleys & Drives															
11	Cams															
12	Properties of Materials															
13	Simplified Drafting															
14	Axonometric Pictorials															
15	Perspective Drawing															
16	Charts and Graphs															
17	Precision Dimensioning															
18	Military Standards															
19	Freehand Drawing															
20	Intersection & Development															
21																
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE: .

CODE: 003

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1	Successive Auxiliary Views															
2	Threads & Fasteners															
3	Welding Drawing															
4	Shop Processes															
5	Detail Drawings															
6	Assembly Drawings															
7	Exploded Pictorials															
8	Drafting Room Practices															
9	Drawing Reproduction															
10	Gears, Pulleys & Drives															
11	Cams															
12	Properties of Materials															
13	Simplified Drafting															
14	Axonometric Pictorials															
15	Perspective Drawing															
16	Charts and Graphs															
17	Precision Dimensioning															
18	Military Standards															
19	Freehand Drawing															
20	Intersection & Development															
21																
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 004

	Topic	Relative Importance											Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10					
1	Blueprinting (Wet Process)																
2	Sepia, Blue Line, Brown Line																
3	Diazo Process																
4	Photostats																
5	Thermofax																
6	Spirit Duplicator																
7	Mimeograph																
8	Offset Process																
9	Silk Screen																
10	Microfilm - Aperture Cards																
11	Microfiche																
12	Computer Storage & Retrieval																
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 005

	Topic	Relative Importance											Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10					
1	View Interpretation																
2	Material Specifications																
3	Tooling Specifications																
4	Tolerance Interpretation																
5	Scheduling																
6	Field Trips																
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 011

	Topic	Relative Importance											Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10					
1	Orthographic Projection																
2	Views of Points, Lines, Planes																
3	Skew Lines																
4	Piercing Points																
5	Plane Intersections																
6	Perpendicularity - Lines & Planes																
7	Dihedral Angles																
8	Angle Between Line & Plane																
9	Revolution																
10	Intersection & Development																
11	Charts & Graphs																
12	Graphical Mathematics																
13	Vector Graphics																
14	Linkage Analysis																
15	Mining & Geology Problems																
16	Topography & Mapping																
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 021

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1	History of Architecture															
2	Styles of Architecture															
3	Architectural Line Symbols															
4	Architectural Lettering															
5	Area Planning															
6	Landscaping															
7	Floor Plans															
8	Elevations															
9	Sections															
10	Pictorials															
11	Perspective															
12	Foundation Plans															
13	Site Plans															
14	Framing Plans															
15	Schedules, Codes & Specifications															
16	Electrical, Plumbing, Heating															
17	Modular Construction															
18	Cost Estimating															
19	Shade & Shadow															
20	Door & Window Details															
21	Pencil, Ink, Paint Rendering															
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 022

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1	Schedules, Codes & Specifications															
2	Electrical Wiring															
3	Plumbing Layout															
4	Duct Work															
5	Modular Construction															
6	Cost Estimating															
7	Millwork Drawings															
8	Built-in Equipment Drawings															
9	Landscaping															
10	Site Analysis															
11	Commercial Buildings															
12	Structural Drawings															
13	Architectural Design Problems															
14	Field Trips & Site Inspection															
15	Advanced Rendering - Airbrush															
16	Zoning															
17	Environmental Studies															
18	Legal Considerations															
19																
20																
21																
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 023

	Topic	Relative Importance											Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10					
1	Schedules, Codes & Specifications																
2	Electrical Wiring																
3	Plumbing Layout																
4	Duct Work																
5	Modular Construction																
6	Cost Estimating																
7	Millwork Drawings																
8	Built-in Equipment Drawings																
9	Landscaping																
10	Site Analysis																
11	Commercial Buildings																
12	Structural Drawings																
13	Architectural Design Problems																
14	Field Trips & Site Inspection																
15	Advanced Rendering - Airbrush																
16	Zoning																
17	Environmental Studies																
18	Legal Considerations																
19																	
20																	
21																	
22																	
23																	
24																	
25																	

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

509

CODE: 031

	Topic	Relative Importance											Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10					
1	Statics																
2	Strength of Materials																
3	Linkages																
4	Cams																
5	Design Process																
6	Tool Design - Jigs & Fixtures																
7	Individual Projects																
8	Group Projects																
9	Model Building																
10	Gears & Drive Trains																
11	Shop Processes																
12	Guest Speakers (Designers)																
13	Field Trips																
14	Systems Analysis																
15	Production Control																
16	Numerically Controlled Tools																
17	Computer Graphics																
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19__

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 041

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1	Projection Fundamentals															
2	Axonometric Projection															
3	Oblique Drawing															
4	Perspective Drawing															
5	Shades & Shadows															
6	Pencil Rendering															
7	Ink Rendering															
8	Shading Films															
9	Transfer or Cut-out Lettering															
10	Wash (Paint) Rendering															
11	Airbrush Techniques															
12	Coquille Board															
13	Scratchboard															
14	Double-Tone (Craftint)															
15	Publication Layouts															
16	Half-tone (Photo) Process															
17	Color Separation															
18																
19																
20																
21																
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

511

CODE: 042

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1	One- and Two-point Perspective															
2	Three-point perspective															
3	Shades and Shadows															
4	Pencil Rendering															
5	Ink Rendering															
6	Wash Rendering															
7	Shading Films															
8	Transfer or Cut-out Lettering															
9	Publication Layouts															
10	Color Separation															
11	Half-tone (Photo) Process															
12	Silkscreening															
13	Airbrush Techniques															
14	Photo Retouching															
15	Coquille Board															
16	Doubletone (Craftint)															
17	Scratchboard															
18																
19																
20																
21																
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 051

	Topic	Relative Importance											Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10					
1	Steel Fabrication & Shapes																
2	Structural Fasteners																
3	Use of A.I.S.C. Handbook																
4	Use of Smoley's Tables																
5	Shear & Moment Diagrams																
6	Beam Design (Selection)																
7	Truss Analysis																
8	Beam Connection Details																
9	Column Details																
10	Reinforced Concrete-Terminology																
11	Reinforcing Placement																
12	Concrete Beam & Column Joints																
13	Concrete Floors																
14	Concrete Walls																
15	Scheduling																
16	Field Trips																
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19__

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 052

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1	Steel Fabrication & Shapes															
2	Structural Fasteners															
3	Use of A.I.S.C. Handbook															
4	Use of Smoley's Tables															
5	Shear & Moment Diagrams															
6	Beam Design (Selection)															
7	Truss Analysis															
8	Beam Connection Details															
9	Column Details															
10	Reinforced Concrete - Terminology															
11	Reinforcing Placement															
12	Concrete Beam & Column Joints															
13	Concrete Floors															
14	Concrete Walls															
15	Scheduling															
16	Field Trips															
17																
18																
19																
20																
21																
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 061

	Topic	Relative Importance											Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10					
1	Electrical & Electronic Symbols																
2	Circuit Block Diagrams																
3	Schematic Diagrams																
4	Pictorial Diagrams/Drawings																
5	Printed Circuit Drawings																
6	Printed Circuit Production Processes																
7	Integrated Circuit Layouts																
8	Microminature Circuits																
9	Electrical Power Diagrams																
10	Power Distribution & Control																
11	Instrumentation Drawings																
12	Mechanical Layout of Wiring																
13	Cabinet & Panel Design																
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19__

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 071

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1	Types of Maps & Drawings															
2	Classification of Map Information															
3	Special Mapping Instruments															
4	Lettering for Maps															
5	Traverses & Surveys															
6	Map Symbols															
7	Contours															
8	Map Projections															
9	Map Revisions															
10	Photogrammetry															
11	Color Separation															
12	Working from Field Notes															
13																
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session:

☐ regular

☐ summer

Enrollment and date when last taught:

_____ students in 19____

Number of class hours per week:

Lecture: _____ Laboratory: _____

Number of credit hours given for course:

Number and name of prerequisite course, if any:

COURSE:

CODE: 072

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1	Road & Highway Construction															
2	Dams															
3	Earthworks															
4	City Traffic															
5	Utilities Layouts															
6	Residential Sites															
7	Industrial Sites															
8	Recreational Sites															
9	Geologic Maps															
10	Subsurface Maps															
11	Diagrams & Cross-Sections															
12	Well Logs & Symbols															
13	Mine & Quarry Maps															
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19__

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

517

CODE: 081

	Topic	Relative Importance											Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10					
1	Aircraft Nomenclature																
2	Principles of Flight																
3	Mechanisms & Linkages																
4	Airframe Structure																
5	Aerodynamic Surfaces																
6	Aircraft Structural Materials																
7	Fasteners																
8	Adhesives																
9	Electrical & Hydraulic Systems																
10	Fuel System Layout																
11	Military Specifications																
12	Drafting Room Manuals																
13	Landing Gear Systems																
14	Flight Control Systems																
15	Power Plant Considerations																
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19__

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 091

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1	Pipe Fittings Nomenclature															
2	Single-line Orthographic															
3	Double-line orthographic															
4	Single-line Pictorials															
5	Pipe & Fitting Materials															
6	Joints															
7	Sanitary Sewers															
8	Water Supply Piping															
9	Pipe Grades (Slopes)															
10	Building Codes															
11	Gas Piping															
12	Control & Metering Devices															
13	Flow Diagrams															
14	Vessels															
15	Heat Exchangers															
16	Pumps & Compressors															
17	Air Ducting & Filtering															
18	Fans & Blowers															
19	Sewage Treatment															
20																
21																
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19__

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 101

	Topic	Relative Importance											Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10					
1	Theory of Developments																
2	Forming Processes																
3	Bond Radii																
4	Edge-margin Requirements																
5	Forming Tables																
6	Templates																
7	Stampings																
8	Stamping Tooling																
9	Sheeting Materials																
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

COURSE:

CODE: 121

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1	Individual Designs															
2	Group/Team Projects															
3	Model Construction															
4	Written & Graphical Presentation															
5	Oral Presentation															
6	Patent Applications															
7																
8																
9																
10																
11																
12																
13																
14																
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20																
21																
22																
23																
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25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number): _____

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19____

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

PLEASE USE THE FOLLOWING SHEETS TO LIST ANY
DRAFTING COURSES IN YOUR CURRICULUM WHICH
HAVE NOT BEEN INCLUDED IN THIS QUESTIONNAIRE.

COURSE:

CODE:

	Topic	Relative Importance										Lect	Lab	Less	Equal	More
		0	1	2	3	4	5	6	7	8	9	10				
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
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16																
17																
18																
19																
20																
21																
22																
23																
24																
25																

This course is: ☐ specifically required ☐ an elective necessary to fulfill credit requirements ☐ a permitted substitute for (course name and number):

Term in the program when scheduled (circle one): 1 2 3 4 5 6 7 8

Regular or summer session: ☐ regular ☐ summer

Enrollment and date when last taught: _____ students in 19__

Number of class hours per week: Lecture: _____ Laboratory: _____

Number of credit hours given for course: _____

Number and name of prerequisite course, if any: _____

DISTRIBUTION OF COURSE TYPES AMONG SCHOOLS

Drafting Hrs Proportion	Physical Sciences Hrs Proportion	Engineering Hrs Proportion	Communicative Arts Hrs Proportion	Social Sciences Hrs Proportion	Others Hrs Proportion	Total Hrs
30 .469	17 .266	2 .031	6 .094	9 .140	0 0	64
33 .508	13 .200	7 .108	6 .092	6 .092	0 0	65
32 .492	12 .184	14 .215	6 .092	0 0	1 .015	65
30 .441	6 .088	22 .323	6 .088	3 .044	1 .015	68
35 .473	13 .176	0 0	6 .081	15 .203	5 .068	74
15 .208	28 .389	0 0	12 .167	12 .167	5 .069	72
27 .435	17 .274	3 .048	9 .145	6 .097	0 0	62
23 .338	12 .176	24 .353	6 .088	3 .044	0 0	68
22 .349	15 .238	11 .174	6 .095	9 .143	0 0	63
35 .547	6 .094	0 0	9 .140	12 .187	2 .031	64
33 .508	12 .184	11 .169	6 .092	0 0	3 .046	65
36 .514	10 .143	4 .057	6 .086	9 .128	5 .071	70
12 .193	17 .274	16 .258	9 .145	3 .048	5 .081	62
21 .309	16 .235	22 .323	6 .088	0 0	3 .044	68
27 .386	12 .171	20 .286	3 .043	3 .043	5 .071	70

(Continued)

Distribution of Course Types Among Schools--Continued

Drafting Hrs Proportion	Physical Sciences Hrs Proportion	Engineering Hrs Proportion	Communicative Arts Hrs Proportion	Social Sciences Hrs Proportion	Others Hrs Proportion	Total Hrs
21 .304	17 .246	5 .072	9 .130	13 .188	4 .058	69
30 .461	14 .215	6 .092	6 .092	6 .092	3 .046	65
24 .369	20 .308	0 0	9 .138	12 .184	0 0	65
42 .666	6 .095	6 .095	6 .095	3 .048	0 0	63
24 .353	16 .235	13 .191	9 .132	3 .044	3 .044	68
36 .554	13 .200	3 .046	6 .092	6 .092	1 .015	65
22 .328	10 .149	13 .194	9 .134	9 .134	4 .060	67
36 .580	9 .145	6 .097	6 .097	0 0	5 .081	62
24 .348	16 .232	0 0	12 .174	12 .174	5 .072	69
34 .515	10 .151	5 .076	9 .136	6 .091	2 .030	66

Summary of Course Type Proportions

$\sum X_i$: 10.648	5.068	3.208	2.756	2.383	0.917	1659
$\sum X_i^2$: 4.856	1.146	0.719	0.327	0.333	0.055	110335
$\bar{X}$: .426	.203	.128	.110	.095	.037	68.0
90% C.I. [.385 to .467]	.179 to .227	.088 to .168	.098 to .122	.072 to .118	.027 to .047	

Confidence Intervals Determined by the t-Test

For small samples, the confidence limits on the estimated population mean is given by

$$\bar{X} - t \frac{s}{\sqrt{N-1}} \leq \mu \leq \bar{X} + t \frac{s}{\sqrt{N-1}}$$

where μ = estimated population mean

$\bar{X}$ = sample mean

s = sample standard deviation

N = sample size

t = a theoretical distribution of varying degrees of freedom (equal to $N-1$ for the mean estimate)

Linear Regression Analysis

General Linear Regression

For a set of paired data values, (X, Y) , the linear regression equation for Y on X is given by

$$Y^1 = b_{yx}X + a$$

and for X on Y , the equation is of the form

$$X^1 = b_{xy}Y + a$$

where X^1 and Y^1 represent values calculated from the respective equations. (Ferguson, 1959, p. 121)

Linear Regression Through the Origin

To force the regression through the origin, these equations become, respectively,

$$Y^1 = b_{yx}X \text{ and } X^1 = b_{xy}Y$$

Method of Least Squares

To determine b_{xy} and b_{yx} (slopes of the regression lines) by the method of least squares, the criterion is that:

$$\sum(Y - Y^1)^2 \text{ and } \sum(X - X^1)^2$$

have minimum values, where the summations are taken over the number of data pairs (points). This can be accomplished by requiring that

$$\frac{\partial}{\partial b_{yx}} \sum (Y - Y^1)^2 = \frac{\partial}{\partial b_{yx}} \sum (Y - b_{yx}X)^2 = 0$$

and
$$\frac{\partial}{\partial b_{xy}} \sum (X - X^1)^2 = \frac{\partial}{\partial b_{xy}} \sum (X - b_{xy}Y)^2 = 0$$

These partial derivatives given the following expressions for b_{yx} and b_{xy} :

$$b_{yx} = \frac{\sum X^2}{\sum XY} \quad \text{and} \quad b_{xy} = \frac{\sum Y^2}{\sum XY}$$

Coefficient of Correlation

The degree to which the paired data fall on the regression lines is indicated by the coefficient of correlation, r , given by the expression

$$r = \sqrt{b_{yx}b_{xy}}$$

Kendall's Coefficient of Concordance with Tied Ranks--Corrected for Added Items

The coefficient of Concordance

Ferguson (1959, p. 226) indicates the coefficient of concordance for m judges ranking N items is given by

$$W = \frac{S_o}{S_p}$$

where W = Kendall's coefficient of concordance

and S_o = the sum of squared deviations from the mean of the observed rank sums for each item, given by

$$S_o = \sum_{j=1}^N (R_j - \bar{R})^2$$

where R_j = sum over m observed ranks for the j th item

$$\text{and } \bar{R} = \frac{1}{N} \sum_{j=1}^N R_j$$

S_p = the maximum possible sum of squared deviations from the mean of rank sums (for perfect agreement--"concordance"--between the m judges), given by

$$S_p = \frac{m^3}{12} (N^3 - N)$$

Correction for Tied Ranks

According to Ferguson (1959, p. 227) the occurrence of tied ranks among items tends to increase W , and if ties are numerous, a correction factor is applied to S_p . This correction factor is computed for ties occurring among ranked items for each judge and is given in part by:

$$T = \frac{\sum (t^3 - t)}{12}$$

where T = correction factor for one judge

t = number of ties occurring in any one rank

The summation is taken over the ranks in which ties occurred.

Example: If ten items are ranked by one judge as 1, 2.5, 2.5, 4, 5, 6, 8, 8, 8, 10, there are two groups of ties, one of two ranks (2.5, 2.5), and one of three ranks (8, 8, 8). Thus:

$$T = \frac{(2^3 - 2) + (3^3 - 3)}{12} = 2.5$$

To correct W for ties in rank over the m sets of ranks, the sum of correction factors, $\sum T$, is made over the m sets, and W becomes:

$$W = \frac{S_o}{S_p - m\sum T}$$

Modification of W for Added Items

Reference has been made (p. 281) to an assumed rating of zero or lowest rank, being assigned to write-in topics (items) not ranked by some respondents (judges). These assumed ranks might tend to augment the agreement between judges, thereby increasing the obtained value of W. To offset this tendency, the computation of W was modified so as to depress W. The new computation considers that the ranks assigned to the added items represent total disagreement among judges. Under this condition, the rank sums for the added items would be equal, and possess a value equal to the mean rank sum for all the items judged (the limiting condition for total disagreement among judges). So as to retain the original mean rank sum, the original rank sums, R_j , were replaced by new rank sums, R_j^1 , computed as follows:

$$R_j^1 = \begin{cases} R_j + \frac{S_k - k\bar{R}}{N - k} & ; j = 1, 2, 3, \dots, N-k \\ \bar{R} & ; j = N-k+1, N-k+2, \dots, N \end{cases}$$

where k = number of added items,

$$S_k = \sum_{j=N-k+1}^N R_j$$

$$\text{and } \bar{R} = \frac{1}{N} \sum_{j=1}^N R_j$$

The quantity

$$\frac{S_k - k\bar{R}}{N - k}$$

represents the difference between the actual rank sums for the k added items and the mean rank sum for all N items, distributed equally among the original (non-added) $N-k$ item rank sums. The end result is that the sum of squared deviations from the mean rank sum is decreased:

$$S_o^1 = \sum_{j=1}^N (R_j^1 - \bar{R})^2$$

To further offset the effect of assumed ranks for added items, the correction for ties in rank which might occur was not made, by subtracting from the original tie-correcting factor that quantity which would correct for perfect ties in the k added item ranks for all m judges. That quantity is given by the expression

$$m \sum T_k = m \sum \frac{(k^3 - k)}{12} = \frac{m^2}{12} (k^3 - k)$$

Combining both the above corrections, a new coefficient of concordance is given by:

$$W^1 = \frac{S_o^1}{S_p - m \sum T + \frac{m^2}{12} (k^3 - k)}$$

Chi-Square Test of Significance of W

The significance of W is given by Ferguson (1959, pp. 227-28) as a chi-square test for N greater than seven, using the quantity

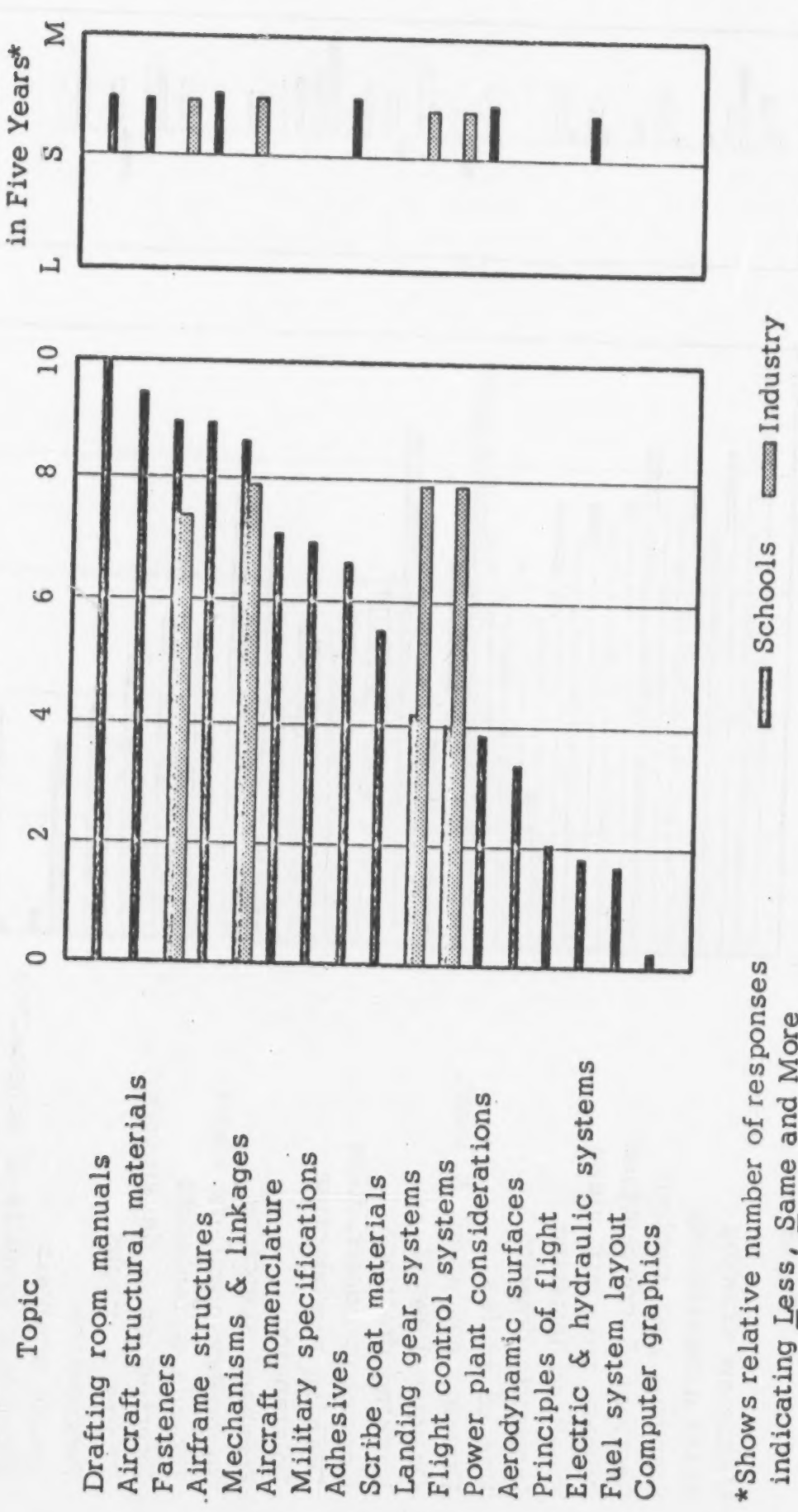
$$X^2 = m(N-1)W$$

which has a chi-square distribution with N-1 degrees of freedom.

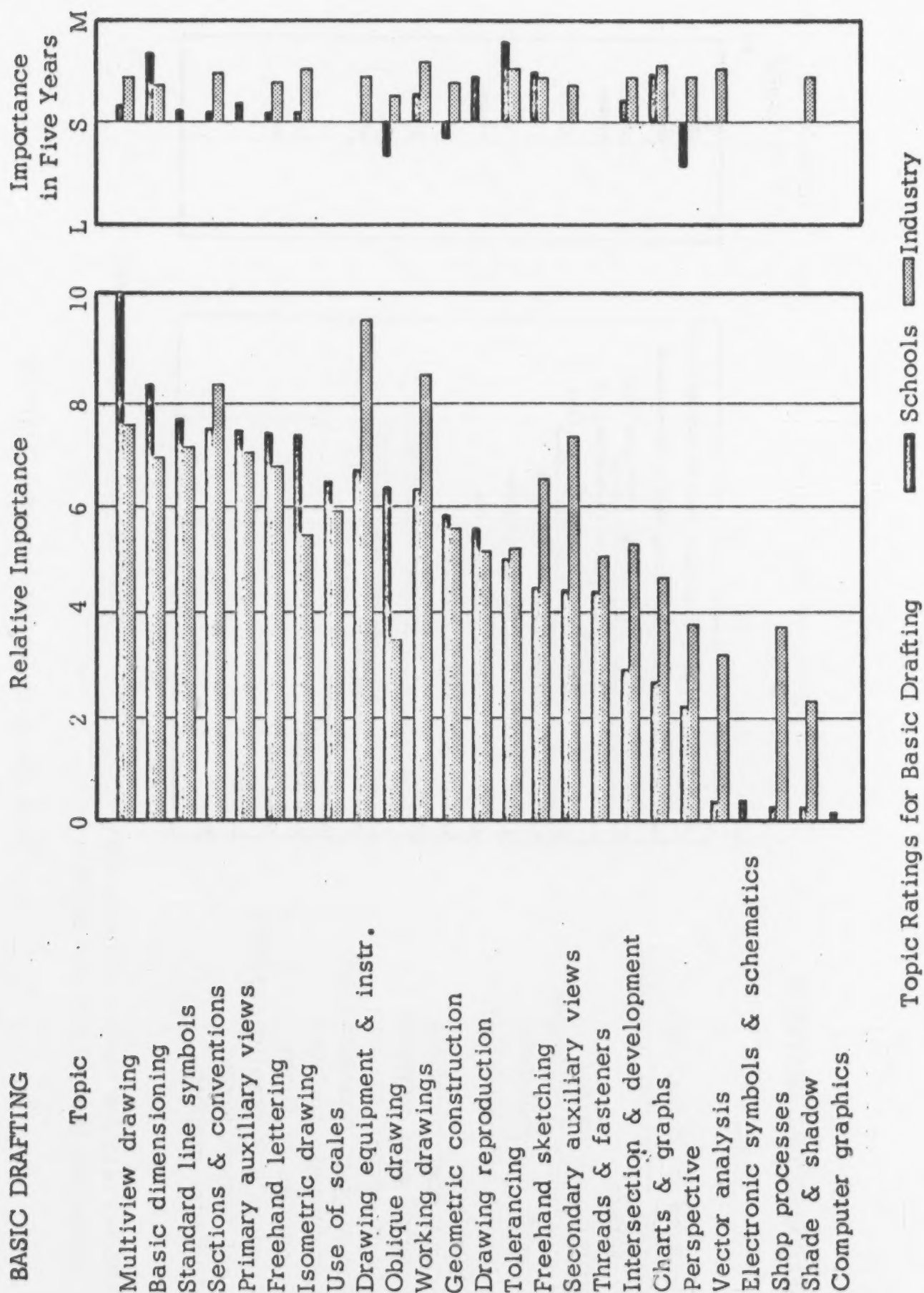
The test for concordance, or agreement, among judges is to determine the probability that X^2 exceeds the critical value of chi-square for N-1 degrees of freedom. The hypothesis being tested is H_0 : there is no agreement among the m judges in ranking the N items. If X^2 exceeds the tabulated critical value at some predetermined level of significance (the .01 level was the criterion used here), then agreement among the judges' rankings was said to exist.

It should be noted that the modification of W for added items depressed the value of W (and hence, X^2) which would otherwise have been obtained; thus, any rejection of H_0 could be said to have occurred in spite of the low ranks assigned to added items which were not ranked by respondents.

AERONAUTICAL DRAFTING



Topic Ratings for Aeronautical Drafting



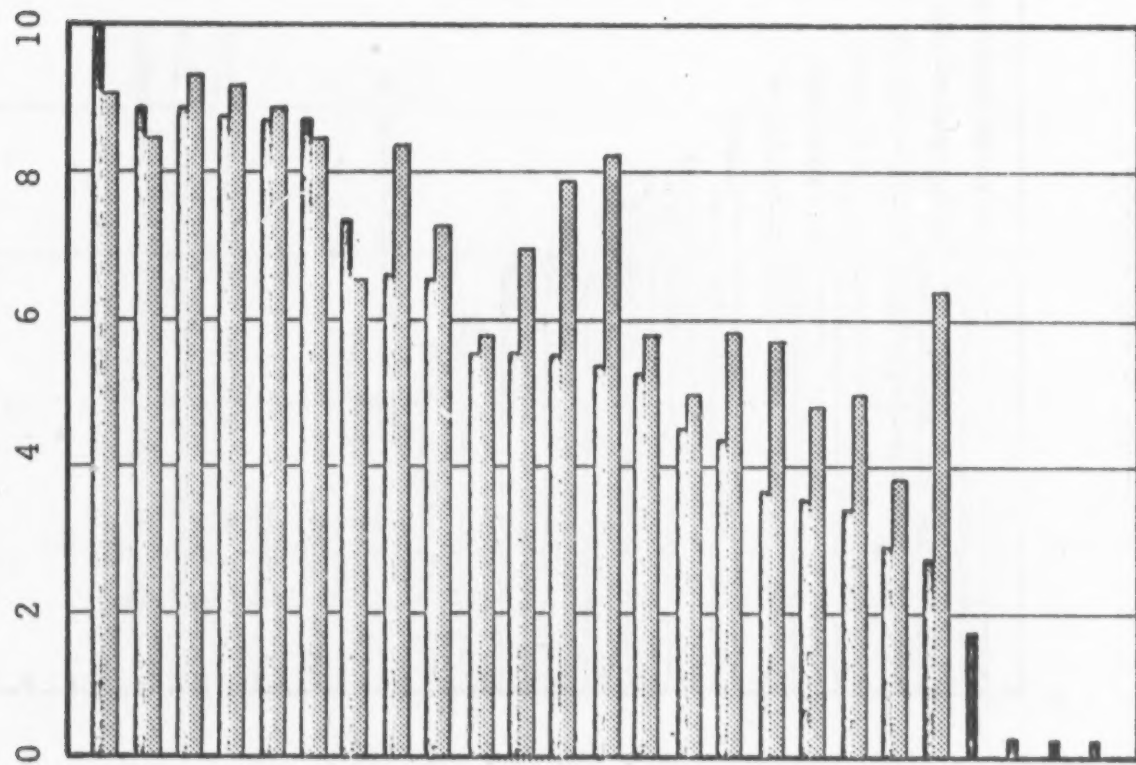
BUILDING CONSTRUCTION

DRAFTING I

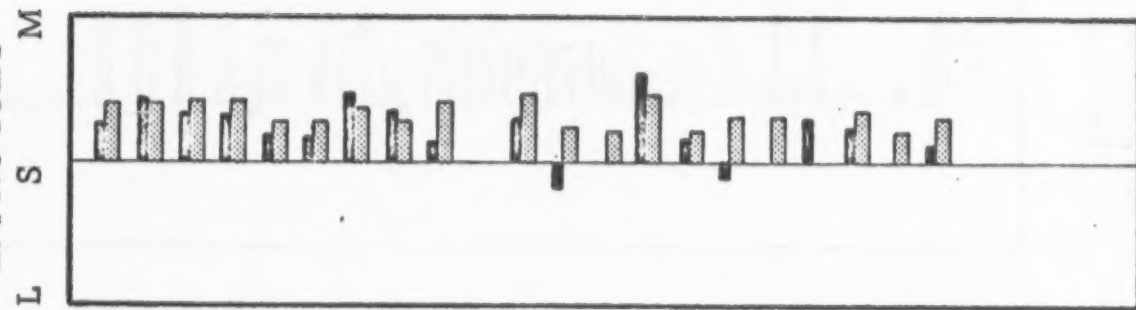
Topic

Floor plans
Foundation plans
Elevations
Sections
Architectural line symbols
Architectural lettering
Schedules, codes & specs.
Site plans
Electrical, plumbing, heating
Perspective
Area planning
Door & window details
Framing plans
Modular construction
Styles of architecture
Pictorials
Cost estimating
Pencil, ink, paint rendering
Landscaping
History of architecture
Shade & shadow
Miscellaneous details
Field practice
Models
Computer graphics

Relative Importance



Importance in Five Years



Topic Ratings for Building Construction I

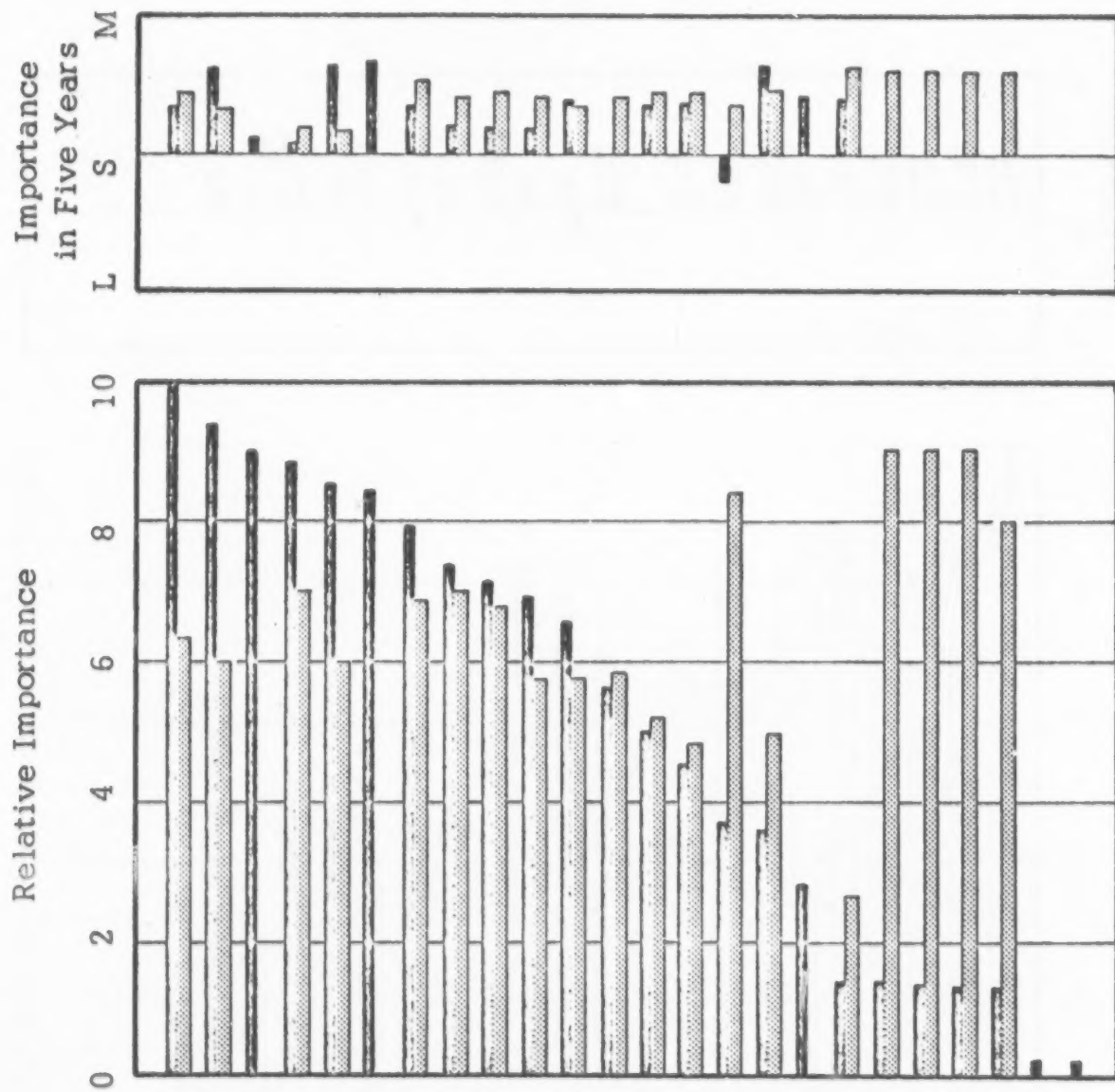
Schools

Industry

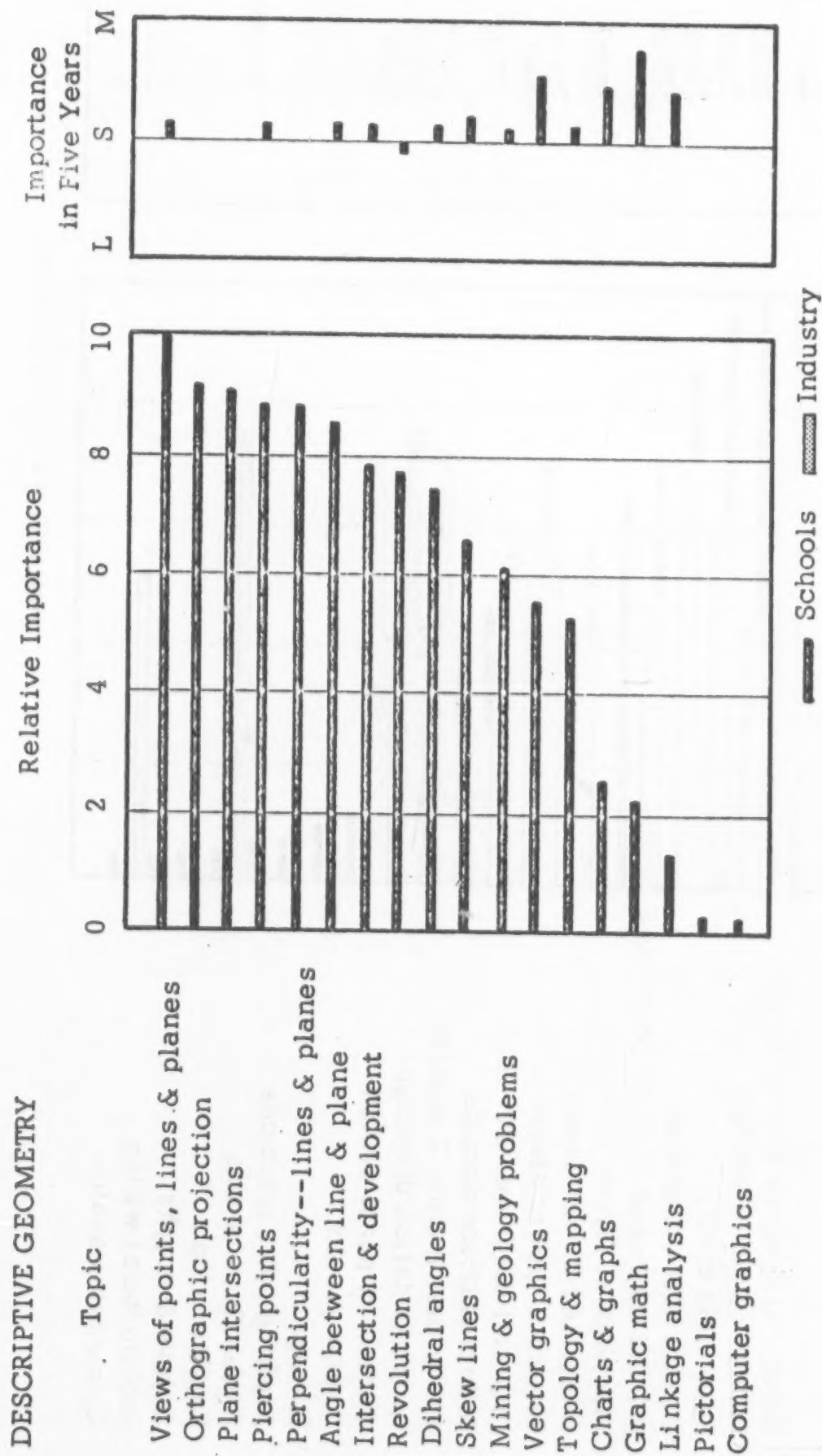
BUILDING CONSTRUCTION DRAFTING II

Topic

Schedules, codes & specs.
Modular construction
Architectural design problems
Structural drawings
Field trips & site inspection
Commercial buildings
Site analysis
Electrical wiring
Plumbing layout
Cost estimating
Duct work
Built-in equipment drawings
Landscaping
Zoning
Millwork drawings
Legal considerations
Environmental studies
Advanced rendering--airbrush
Floor plans
Sections
Elevations
Foundation plans
Construction materials
Models



Topic Ratings for Building Construction II

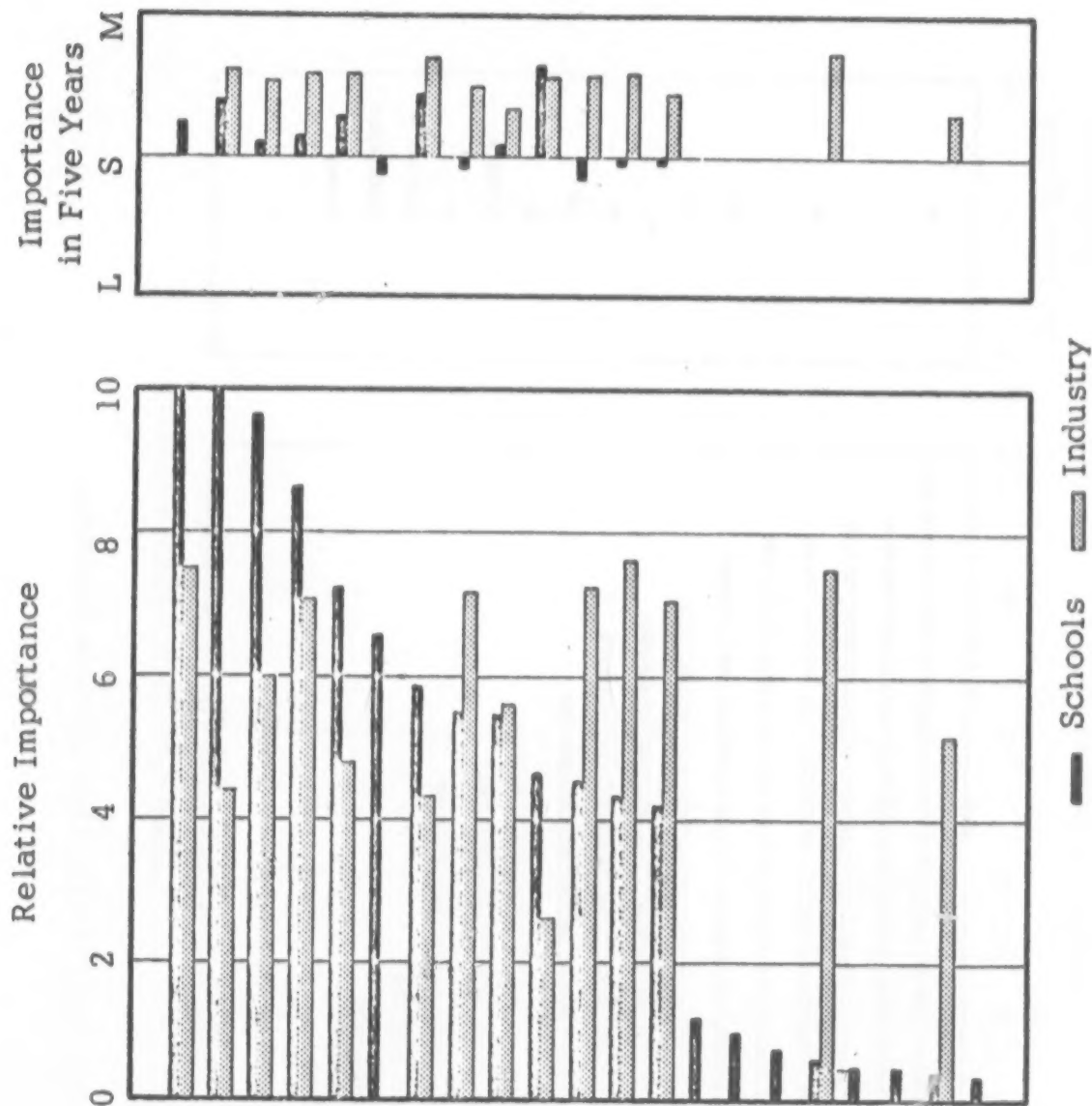


Topic Ratings for Descriptive Geometry

ELECTRICAL & ELECTRONIC DRAFTING

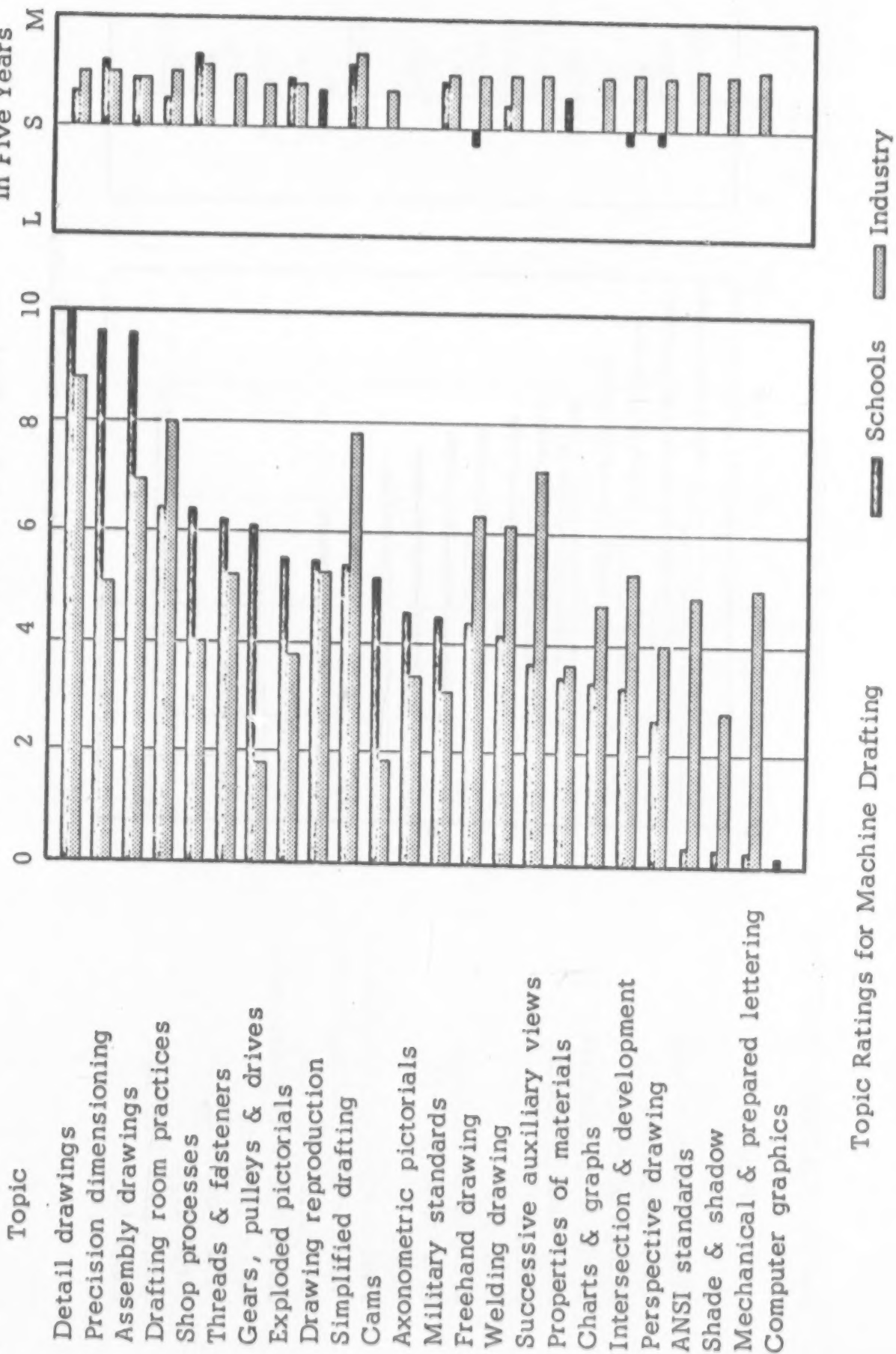
Topic

- Electrical & electronic symbols
- Printed circuit drawings
- Schematic diagrams
- Circuit block diagrams
- Printed circuit production processes
- Mechanical layout of wiring
- Integrated circuit layouts
- Electrical power diagrams
- Pictorial diagrams/drawings
- Microminiature circuits
- Power distribution & control
- Instrumentation drawings
- Cabinet & panel design
- Design projects
- Inking
- Drafting room practices
- Codes & standards
- Reproduction
- Charts & graphs
- Architectural wiring
- Computer graphics



Topic Ratings for Electrical & Electronic Drafting

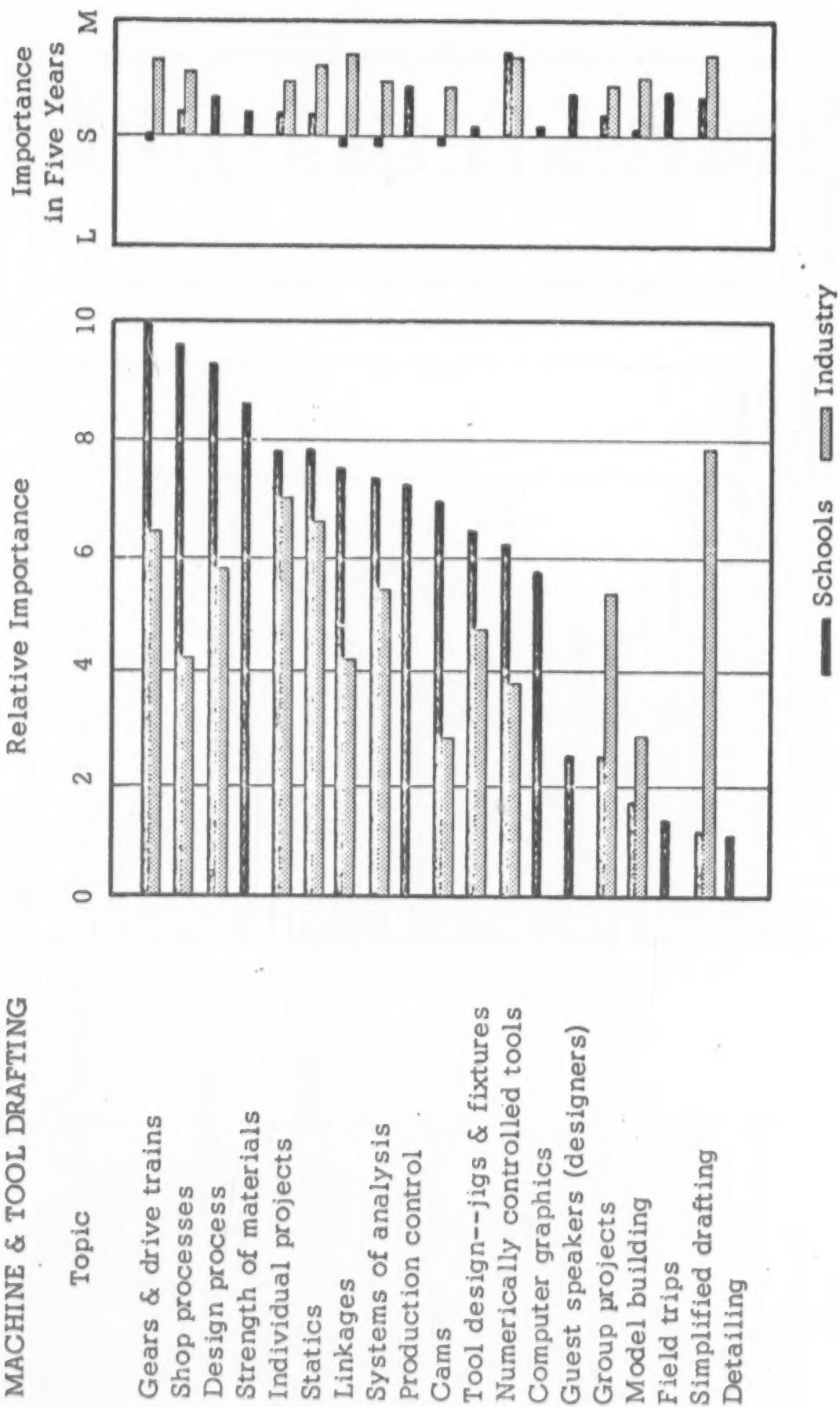
MACHINE DRAFTING



Topic Ratings for Machine Drafting

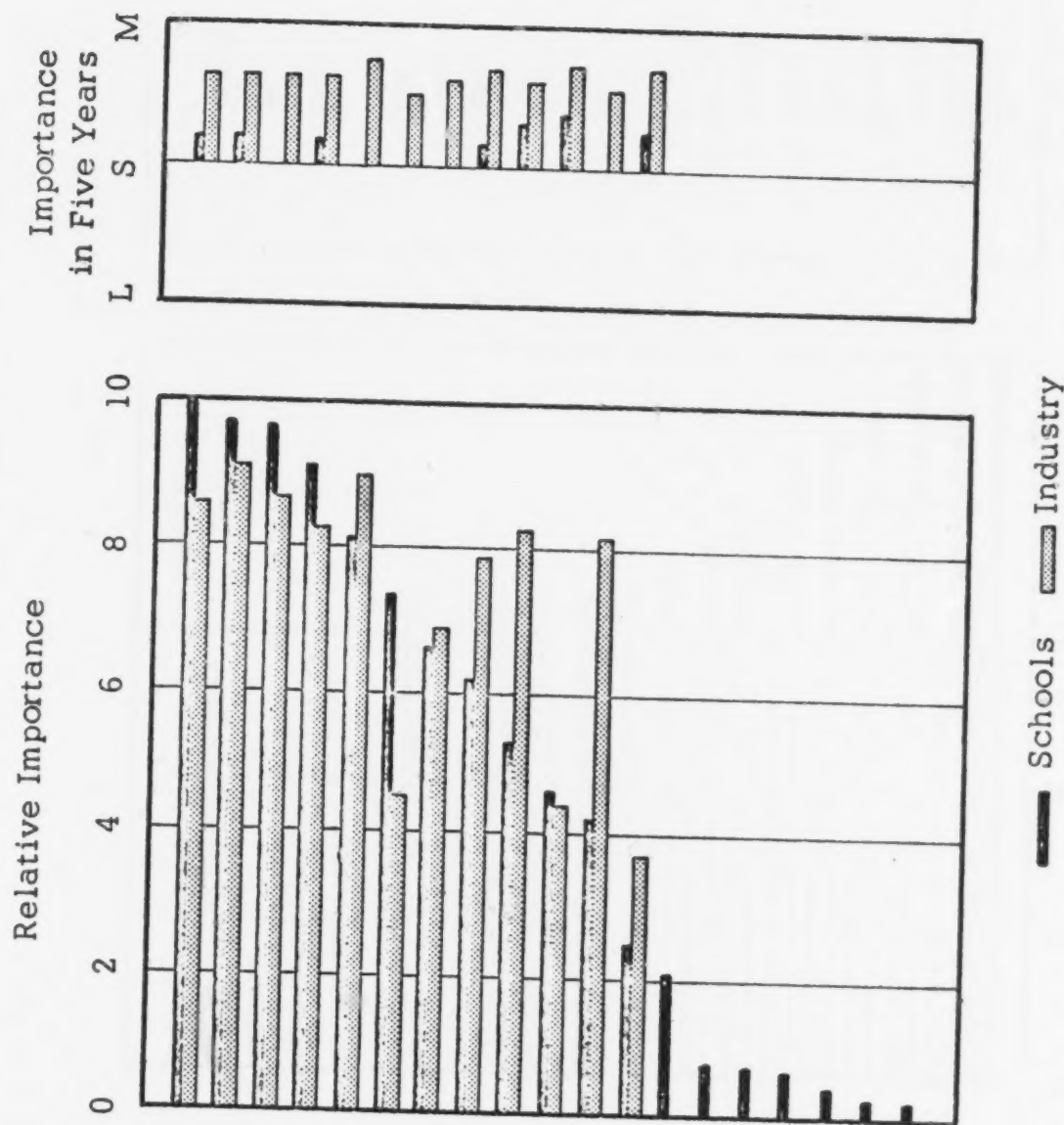
Schools Industry

MACHINE & TOOL DRAFTING



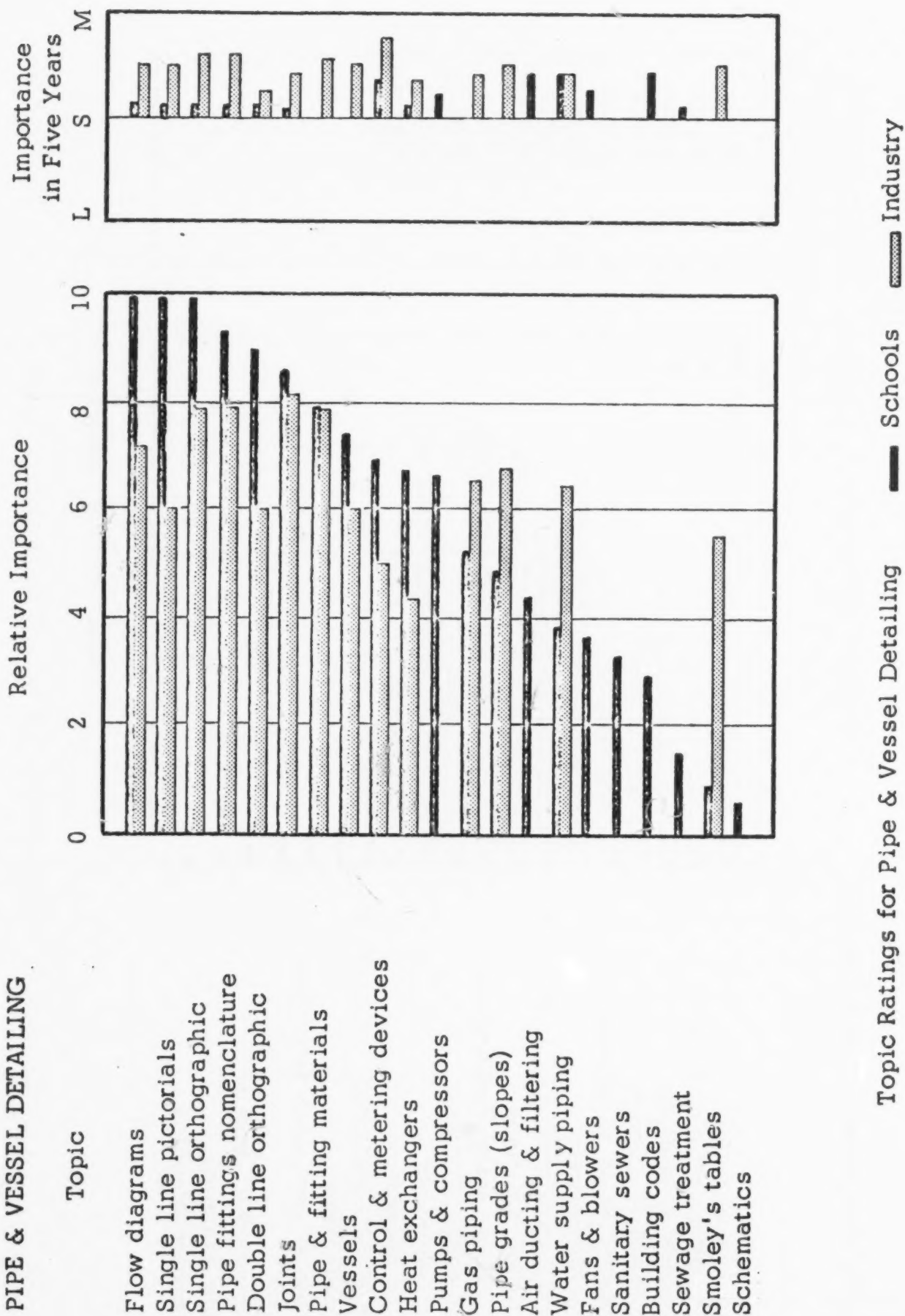
MAP & TOPOGRAPHIC DRAFTING

- Map symbols
- Working from field notes
- Contours & profiles
- Traverses & surveys
- Types of maps & drawings
- Map projections
- Classification of map information
- Lettering for maps
- Special mapping instruments
- Photogrammetry
- Map revisions
- Color separation
- Cut & fill; earthwork calculations
- Reproduction
- Scribe & peel coat techniques
- Inking
- Hydrographic drawing
- Route planning
- Computer graphics



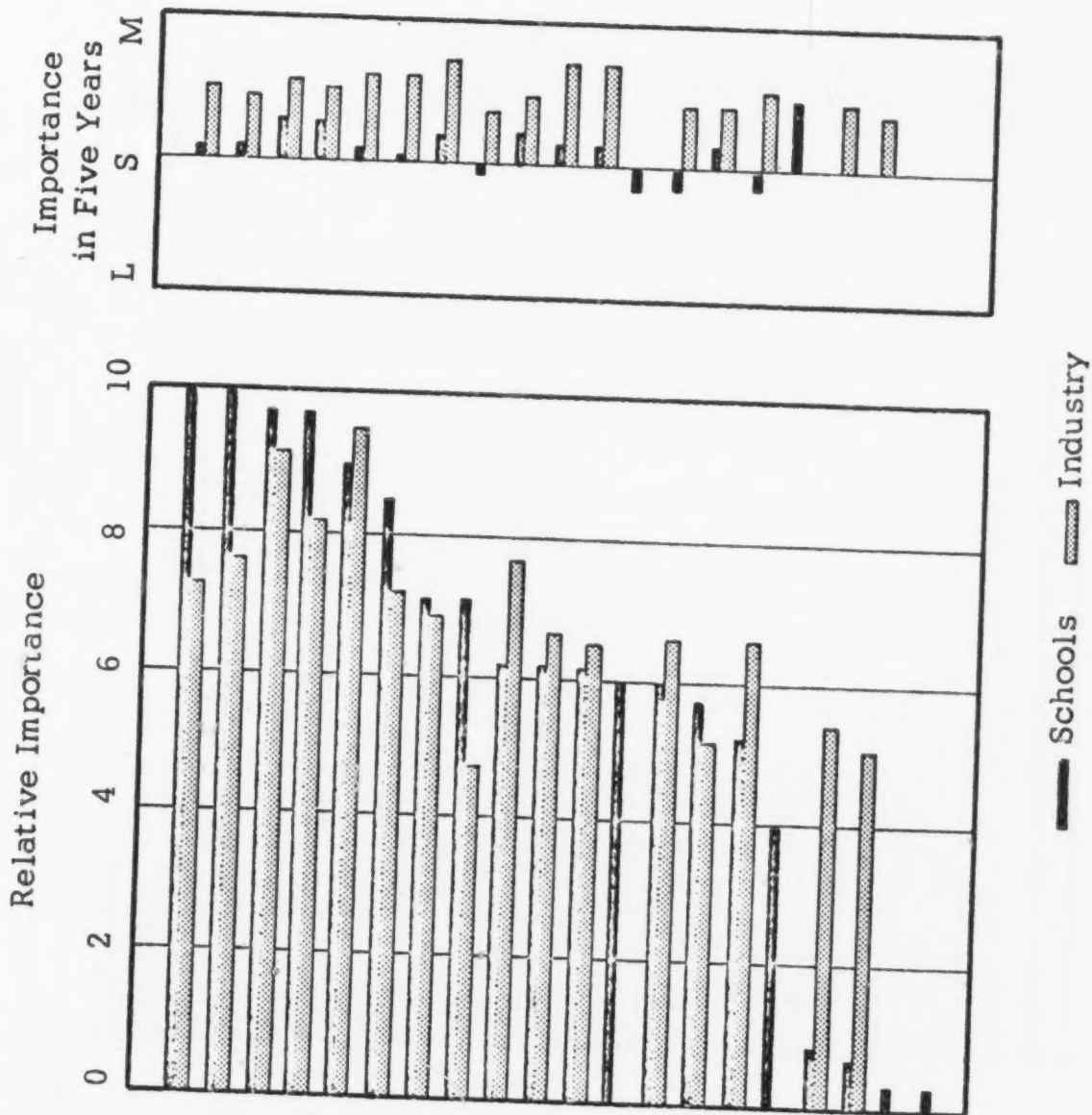
Topic Ratings for Map & Topographic Drafting

PIPE & VESSEL DETAILING



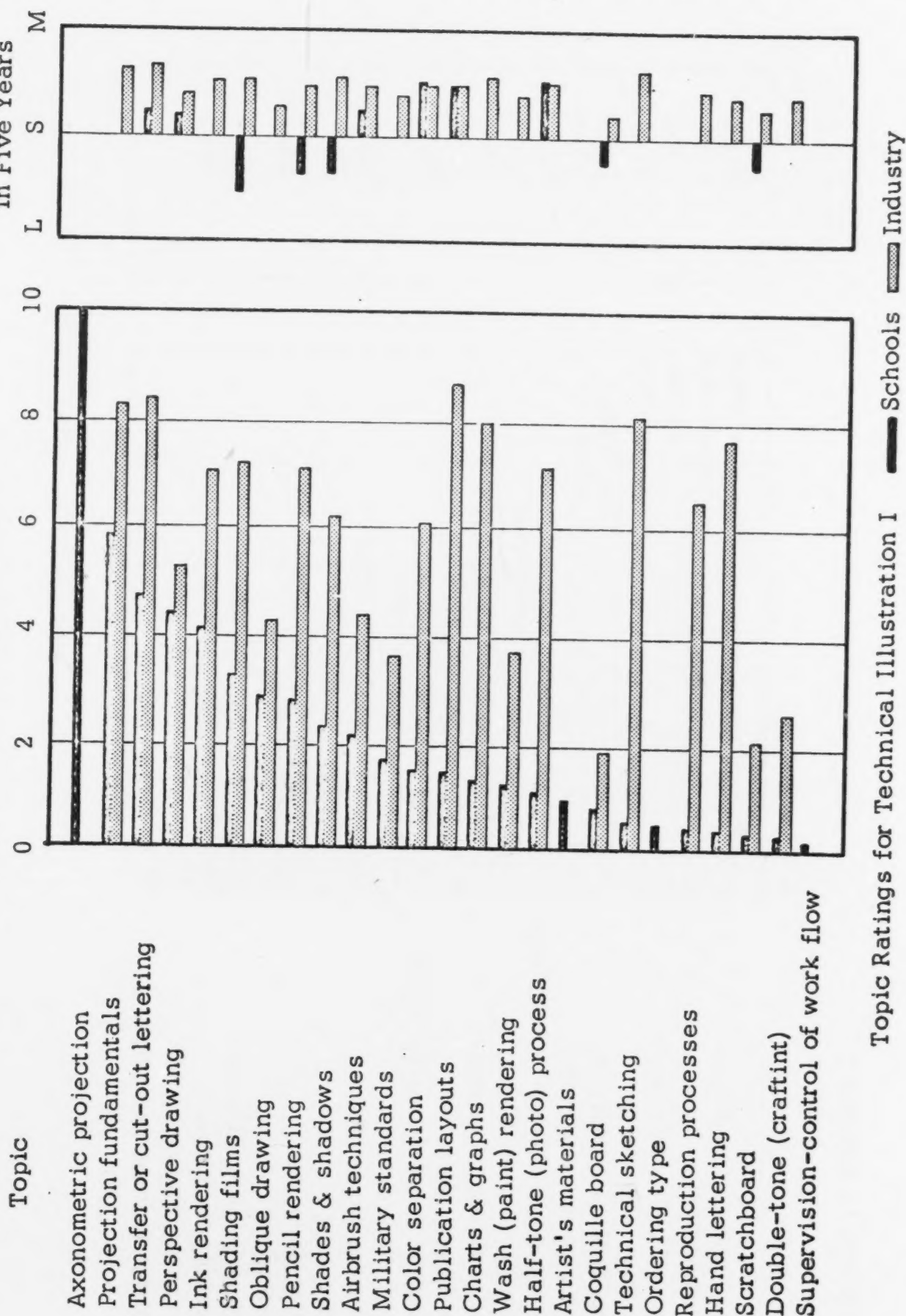
STRUCTURAL DRAFTING I

Beam connection details
 Column details
 Use of AISC handbook
 Structural fasteners
 Steel fabrics & shapes
 Beam design (selection)
 Reinforced concrete--terminology
 Shear & moment diagrams
 Use of Smoley's tables
 Reinforced placement
 Concrete beam & column joints
 Truss analysis
 Concrete floors
 Scheduling
 Concrete walls
 Field trips
 Estimating & contracting
 Wooden structures
 Computer graphics
 History & great designers



Topic Ratings for Structural Drafting I

TECHNICAL ILLUSTRATION I



Topic Ratings for Technical Illustration I

APPENDIX B--The Facilities Survey

Sample Letters

Sample Questionnaire

DRAFTING FACILITIES STUDY

"A STUDY OF BUILDINGS AND EQUIPMENT
IN TEXAS JUNIOR COLLEGE PROGRAMS"

GARY H. WINEGAR
ENGINEERING GRAPHICS DEPARTMENT
TEXAS A&M UNIVERSITY
COLLEGE STATION, TEXAS 77840
PHONE 713-846-7583 OR 845-4451



INTRODUCTORY LETTER TO SCHOOLS

Dear President _____:

With the continual growth of junior college drafting programs, it has become apparent that facility guidelines are needed. During this year, an extensive study is being prepared to gather information about the physical facilities of all state-approved drafting technology programs.

An inventory form and a personal visit to each state-approved drafting program will be the means of gathering the information for this study. The inventory form is designed to obtain information about buildings and equipment of each college, and in addition, to get the suggestions and recommendations for drafting facilities from each drafting instructor and director. During the personal visit to each college, permission will be requested to take pictures of the drafting facilities to enable a pictorial as well as a graphical and tabular presentation of the facilities.

Because _____ (name of college) is one of the state-approved drafting programs, I request your assistance in this cooperative study with the Department of Vocational and Adult Education of the Texas Education Agency.

Please complete the enclosed form and return it at your earliest convenience.

Sincerely,

Gary H. Winegar
Principal Investigator

IN COOPERATION WITH THE TEXAS EDUCATION AGENCY

PARTICIPATION FORM ACCOMPANYING INTRODUCTORY LETTER

This form is to be completed by a school representative in cooperation with the drafting and design technology department. Please return this information in the enclosed self-addressed envelope at your earliest convenience.

Yes, we will participate in the research project. For future correspondence, contact the following person in our drafting department. (please print)

_____	_____	
Name	Title	

Department		

College		
_____	_____	_____
Town	State	Zip

No, we will not participate in the research project.

School Representative _____
Signature

DRAFTING FACILITIES STUDY

"A STUDY OF BUILDINGS AND EQUIPMENT
IN TEXAS JUNIOR COLLEGE PROGRAMS"

GARY H. WINEGAR
ENGINEERING GRAPHICS DEPARTMENT
TEXAS A&M UNIVERSITY
COLLEGE STATION, TEXAS 77840
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INITIAL LETTER TO PERSON IN CHARGE
OF THE DRAFTING DEPARTMENT

Dear _____:

I was pleased to receive notification from your college that you will participate in the forthcoming physical facilities study. Participation in the study will include two parts. The first part will request the completion of an inventory form by the drafting director and each instructor. The second part will be a personal visit to your college. The purpose of the visit will be to gather additional facilities information and to take pictures of your buildings and equipment.

To make further preparations for the study, it is necessary to obtain the information that is requested on the enclosed sheet. Your cooperation in forwarding this information will be greatly appreciated.

Sincerely,

Gary H. Winegar
Principal Investigator

IN COOPERATION WITH THE TEXAS EDUCATION AGENCY

DRAFTING DEPARTMENTAL INFORMATION SHEET

COLLEGE _____

DATE: _____

1. Please give the name of the director or person in charge of the drafting technology program at your college.

2. Please list the names of each person who teaches drafting in the department.

3. How many drafting laboratories do you have in which scheduled drafting classes are held?

DRAFTING FACILITIES STUDY

"A STUDY OF BUILDINGS AND EQUIPMENT
IN TEXAS JUNIOR COLLEGE PROGRAMS"

GARY H. WINEGAR
ENGINEERING GRAPHICS DEPARTMENT
TEXAS A&M UNIVERSITY
COLLEGE STATION, TEXAS 77840
PHONE 713-846-7583 OR 845-4451



LETTER TO DIRECTOR

Dear _____:

Enclosed is the inventory form(s) which I mentioned in previous correspondence. Before starting to fill out the forms, I suggest that you assign a drafting room for yourself and for each instructor to evaluate in completing the inventory form so that each one of your drafting rooms will be evaluated. Even though you may have more drafting instructors than drafting rooms, please have each instructor complete an inventory form so he is able to offer his suggestions and recommendations.

The inventory form that has DIRECTOR'S COPY on the cover is to be filled out by you. All other forms are identical. Do not let the apparent length of the inventory form deter your answering it. Rather than have the entire form printed single-spaced and reduced to crowd three or four times as many items per page, I have chosen to increase the number of pages for ease of reading, completing, and tabulating.

Please complete the inventory form within the next few days and return it along with the visitational sheet. I am looking forward to receiving your suggestions and recommendations about drafting facilities and to my visit to your college.

Sincerely,

Gary H. Winegar
Principal Investigator

IN COOPERATION WITH THE TEXAS EDUCATION AGENCY

VISITATIONAL SHEET

NAME _____

COLLEGE _____

PHONE (Office) _____ (Home) _____

DATE _____

The purpose of my visit will be to discuss drafting facilities with you and to take pictures of your drafting room(s), storage, special equipment, etc. I also want to obtain light meter readings in your drafting rooms.

To help in scheduling visits to the various junior colleges throughout Texas, please place an "X" in dates that would NOT be convenient for me to visit with you and your drafting facilities.

JANUARY

S	M	T	W	TH	F	S
			X ¹	2	3	4
X ⁵	6	7	8	9	10	11
X ¹²	13	14	15	16	17	18
X ¹⁹	20	21	22	23	24	25
X ²⁶	27	28	29	30	31	

FEBRUARY

S	M	T	W	TH	F	S
						1
X ²	3	4	5	6	7	8
X ⁹	10	11	12	13	14	15
X ¹⁶	17	18	19	20	21	22
X ²³	24	25	26	27	28	

DRAFTING FACILITIES STUDY

"A STUDY OF BUILDINGS AND EQUIPMENT
IN TEXAS JUNIOR COLLEGE PROGRAMS"

GARY H. WINEGAR
ENGINEERING GRAPHICS DEPARTMENT
TEXAS A&M UNIVERSITY
COLLEGE STATION, TEXAS 77840
PHONE 713-846-7583 OR 845-4451



LETTER TO INSTRUCTORS

Dear Mr. _____:

I want to thank you for your assistance in completing this inventory form. Please do not let the apparent length of the inventory form deter your answering it. Rather than have the entire form printed single-space and reduced to crowd three or four times as many items per page, I have chosen to increase the number of pages for ease of reading, completing, and tabulating.

Before you begin filling out the form, check with your drafting director to insure you are evaluating the drafting form he has selected for you.

Your completing the inventory form within the next few days and returning it in the enclosed self-addressed envelope will be greatly appreciated.

Sincerely,

Gary H. Winegar
Principal Investigator

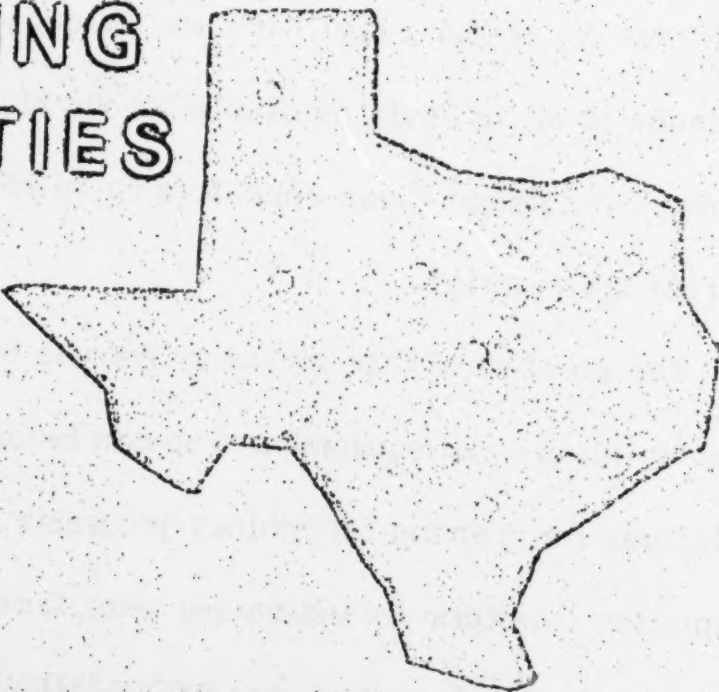
IN COOPERATION WITH THE TEXAS EDUCATION AGENCY

DIRECTOR'S COPY OF INVENTORY FORM

INVENTORY FORM

DIRECTOR'S FORM

DRAFTING
FACILITIES



GARY H. WINEGAR
ENGINEERING GRAPHICS DEPARTMENT
TEXAS A&M UNIVERSITY
COLLEGE STATION, TEXAS

In Cooperation With The
TEXAS EDUCATION AGENCY

FOREWORD

Education in junior colleges must provide suitable facilities to help meet the needs of the challenging world of work. With the continual growth of junior college programs, and especially drafting technology programs, it has become apparent to the Department of Vocational and Adult Education of the Texas Education Agency that guidelines for drafting facilities are needed. As federal legislation continues to make funds available for physical facilities, an enormous challenge faces educators to build new and/or to improve existing laboratories.

The purpose of this inventory form is to gather information about buildings and equipment that can be used to formulate guidelines for drafting technology programs. Your assistance in completing this form by indicating what facilities EXIST at your college and what facilities you RECOMMEND will be greatly appreciated.

Please indicate the NUMBER of the drafting room you have been asked to evaluate.

Room # _____

List your academic and work experience.

NAME _____

COLLEGE _____

ACADEMIC DEGREES

<u>INSTITUTION</u>	<u>DEGREE</u>	<u>YEAR</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

WORK EXPERIENCE
(EDUCATIONAL, INDUSTRIAL, etc.)

<u>Company or School</u>	<u>Length of Employment</u>	<u>Years Employed</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

DEPARTMENTAL INFORMATION

The DRAFTING DIRECTOR is requested to complete this section on departmental information. In completing this form, please offer your constructive suggestions and recommendations that would be helpful in planning drafting buildings and equipment.

CONTENTS

Architectural Characteristics and Furnishings	A
Laboratory Equipment	B
Storage	C
Audio-Visual and Reproducing Equipment	D
Administrative Facilities	E
Educational Enrichment	F
Special Facilities	G
Suggestions and Recommendations	H

The pictures in the Inventory Form are the courtesy
of ARCHITECTURAL RECORD and EUGENE DIETZGEN CO.

DEPARTMENTAL INFORMATION

A. Directions: Place an "X" in either the "Yes" or "No" column and also indicate if the item is NEEDED or NOT NEEDED.

	YES	NO	NEEDED	NOT NEEDED
1. Does the drafting and design technology department have a written and approved master building plan? (excluding equipment)	☐	☐	☐	☐
2. If the department has a master building plan, does it include provisions for <u>future</u> construction of drafting facilities?--	☐	☐	☐	☐
3. Does the department have a written and approved master plan for equipment and machines?-----	☐	☐	☐	☐
4. If the department has a plan for equipment and machines, does it provide for the purchase of <u>future</u> equipment and machines?--	☐	☐	☐	☐
5. Does the department have a written and approved depreciation schedule for existing equipment?-----	☐	☐	☐	☐
6. Within the last five years, have school administrators and/or advisory committees made recommendations for facilities and equipment changes?-----	☐	☐	☐	☐
7. In what year was your drafting building completed? -----				

COMMENTS:

- B. Directions: Please indicate the number of hours per week that each drafting room or drafting lecture room is (or was) occupied by a scheduled class for the fall of 1967, spring of 1968, summer of 1968, and fall of 1968.

	WORK WEEK (Daytime)	EVENINGS OR SATURDAYS
Room #		
a. Fall 1967	hrs./wk.	hrs./wk.
b. Spring 1968	hrs./wk.	hrs./wk.
c. Summer 1968	hrs./wk.	hrs./wk.
d. Fall 1968	hrs./wk.	hrs./wk.
Room #		
a. Fall 1967	hrs./wk.	hrs./wk.
b. Spring 1968	hrs./wk.	hrs./wk.
c. Summer 1968	hrs./wk.	hrs./wk.
d. Fall 1968	hrs./wk.	hrs./wk.
Room #		
a. Fall 1967	hrs./wk.	hrs./wk.
b. Spring 1968	hrs./wk.	hrs./wk.
c. Summer 1968	hrs./wk.	hrs./wk.
d. Fall 1968	hrs./wk.	hrs./wk.
Room #		
a. Fall 1967	hrs./wk.	hrs./wk.
b. Spring 1968	hrs./wk.	hrs./wk.
c. Summer 1968	hrs./wk.	hrs./wk.
d. Fall 1968	hrs./wk.	hrs./wk.

COMMENTS:

- C. Directions: The following table is prepared to summarize the number of students enrolled in drafting classes for the past five years. In the blank spaces below, please indicate the total number of students enrolled in all drafting courses for the respective years in DAY, EVENING, and SUMMER classes. In the column at the right, indicate the number of graduates for each year.

	DAY CLASSES (9 months)	EVENING CLASSES (9 months)	SUMMER CLASSES (both sessions)	GRADUATES (12 months)
1963-64	T.N.S.*	T.N.S.	T.N.S.	T.N.S.
1964-65	T.N.S.	T.N.S.	T.N.S.	T.N.S.
1965-66	T.N.S.	T.N.S.	T.N.S.	T.N.S.
1966-67	T.N.S.	T.N.S.	T.N.S.	T.N.S.
1967-68	T.N.S.	T.N.S.	T.N.S.	T.N.S.

*"T.N.S." represents Total Number of Students.

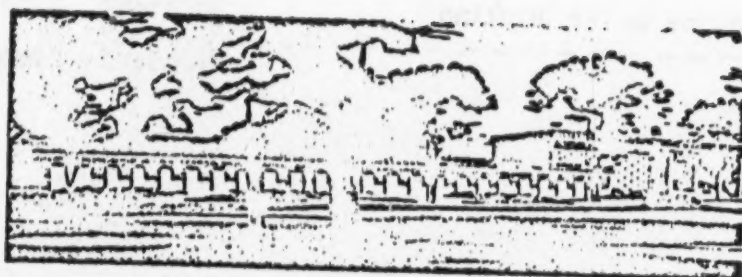
Approximately what per cent of your drafting students are working toward an associate degree in drafting technology? -----

%

COMMENTS:

A

**ARCHITECTURAL
CHARACTERISTICS
AND
FURNISHINGS**



ARCHITECTURAL CHARACTERISTICS AND FURNISHINGS

Directions: Under PRESENT FACILITIES, indicate the existing physical conditions and under RECOMMENDED FACILITIES, designate what you recommend. Answer the questions that have A, B, C, or D responses by placing the appropriate letter(s) in the spaces at the right.

Please note: When a number value is requested in the RECOMMENDED FACILITIES column, please give the total number you recommend. For example, if the present facilities include seven desk lamps and you recommend that this be increased by three, place the number ten, the total number you recommend, in the RECOMMENDED FACILITIES column. Please place a zero in the PRESENT FACILITIES column if none are available.

(Answer the questions in terms of the DRAFTING ROOM you have been assigned to evaluate unless the question refers to the department.)

1. Location of drafting room?
(A) Basement (B) Main floor (C) Second floor (D) Third floor (E) Other _____
2. Number of doors in drafting room? -----
3. Number of doors wider than four feet in the drafting room? -----
4. Kind of floor surface material in the drafting room? -----
5. Number of walls that are movable or portable in the drafting room? (To accommodate for different class sizes and needs.) -----
6. Width of the aisles in the drafting room? -----
7. Number of wash basins in the drafting laboratory? -----

	PRESENT FACILITIES	RECOMMENDED FACILITIES
1. Location of drafting room? (A) Basement (B) Main floor (C) Second floor (D) Third floor (E) Other _____		
2. Number of doors in drafting room? -----		
3. Number of doors wider than four feet in the drafting room? -----		
4. Kind of floor <u>surface</u> material in the drafting room? -----		
5. Number of walls that are movable or portable in the drafting room? (To accommodate for different class sizes and needs.) -----		
6. Width of the aisles in the drafting room? -----		
7. Number of wash basins in the drafting laboratory? -----		

	PRESENT FACILITIES	RECOMMENDED FACILITIES
8. Location of men's rest room? (A) Within 60 ft. of drafting room (B) On another floor (C) In another building (D) Other (specify) _____	☐	☐
9. Location of women's rest room? (A) Within 60 ft. of drafting room (B) On another floor (C) In another building (D) Other (specify) _____	☐	☐
10. Number of drinking fountains within 60 feet of the drafting laboratory? -----	☐	☐
11. Kind of air-conditioning in the drafting room? (A) Central air (B) Refrigerated window unit (C) Water window unit (D) None (E) Other (specify) _____	☐	☐
12. Number of spot ventilating units in the department? (To eliminate chemical vapors and odors of reproducing equipment.) -----	☐	☐
13. Number of student desks in which 110 volt electrical equipment can be used without an extension cord? -----	☐	☐
14. Type of ceiling lights in the drafting room? (A) Fluorescent (B) Incandescent (C) Other (specify) _____	☐	☐
15. Window area (in square feet) in the drafting room? -----	☐	☐

	PRESENT FACILITIES	RECOMMENDED FACILITIES
16. Provisions for darkening the laboratory? (A) Venetian blinds (B) Drapes or curtains (C) Window shades (D) None (E) Other (specify) _____	☐	☐
17. Ceiling height in the drafting room? -----	☐	☐
18. Square feet of chalkboard in the laboratory? ---	☐	☐
19. Acoustical materials and furnishings in the drafting room? -----	☐	☐
Present facilities -----		
Recommended facilities -		

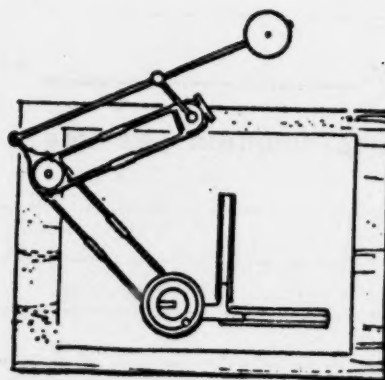
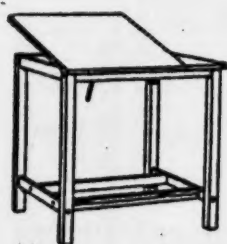
20. Drafting room dimensions and the number of student work stations in the laboratory?

	<u>Dimensions of Laboratory</u>		<u>Number of Work Stations</u>
Present facilities -----	ft. x	ft.	
Recommended facilities -	ft. x	ft.	

21. Colors in the drafting room?

	<u>Ceiling color</u>	<u>Floor color</u>	<u>Walls color</u>
Present facilities ---			
Recommended facilities-			

LABORATORY EQUIPMENT

**B**

LABORATORY EQUIPMENT

Directions: Please indicate the number of each item that is AVAILABLE and also the number that you RECOMMEND of each item. If the item is FURNISHED BY THE STUDENT, place an "X" in the appropriate space at the right.

Please note: The number that you put in the NUMBER RECOMMENDED column should represent the total number recommended. Please place a zero in the NUMBER AVAILABLE column if none are available. Part "A" refers to departmental equipment and Part "B" pertains to the drafting room you are evaluating.

A. Departmental Equipment

1. Number of lettering sets?

Doric-----
 Leroy-----
 Post-----
 Veline-----
 Wrico-----
 Other (specify)-----

2. Number of technical fountain pen sets?

Koh-I-Noor-----
 Leroy-----
 Mars-----
 Post-----

NUMBER
AVAILABLE

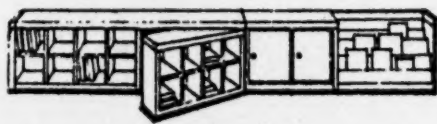
NUMBER
RECOMMENDED

FURNISHED BY
THE STUDENT

	NUMBER AVAILABLE	NUMBER RECOMMENDED	FURNISHED BY THE STUDENT
Wrico -----			
Other (specify)-----			
3. Number of templates? (Please list the number of individual templates unless sets are requested.)			
Plumbing -----			
Window -----			
House plan -----			
Furniture -----			
Hex bolts & nuts -----			
Geometric designs -----			
Machine and cap screw -----			
Alphabet -----			
Circles (sets) -----			
Arrows -----			
Ellipse (sets) -----			
Electronic -----			
Transistor -----			
Other (specify) -----			
B. Drafting Room			
1. Number of drafting pencil sharpeners?--			
2. Number of pencil lead pointers?-----			
3. Number of regulated compressed air outlets?-----			
4. Number of fire extinguishers?-----			
5. Number of drafting stools?-----			

	NUMBER AVAILABLE	NUMBER RECOMMENDED	FURNISHED BY THE STUDENT
6. Number of drafting chairs?-----			
7. Number of table drafting machines?---			
8. Number of chalkboard drafting machines?-----			
9. Number of desks equipped with a parallel straightedge? -----			
10. Number of light tables? -----			
11. Number of drafting tables? -----			
12. Dimensions of the top of the drafting tables?			
Present facilities-----			
Recommended facilities-----			
<u>List other equipment:</u>			

STORAGE



C

STORAGE

Information about your storage facilities is requested for YOUR OFFICE, DRAFTING ROOM (only the one you are evaluating), and the drafting DEPARTMENTAL storage. Please indicate the number and size of each storage facility that is AVAILABLE and that you RECOMMEND. Place a zero in the AVAILABLE space if none are available in your facilities. The number you put in the RECOMMENDED space should represent the total number recommended. For example, if the present facilities include two metal cabinets and you recommend that this be increased by three, place the number five, the total number you recommend, in the RECOMMENDED FACILITIES column. Please place a zero in the PRESENT FACILITIES column if none are available.

YOUR OFFICE STORAGE

BOOK CASES:

(a) Size:

width	height

(b) Number of shelves (Total for all book cases) -----

Comments:FLAT FILES:

(a) Size:

width	depth	height

(b) Number of drawers (Total) -----

Comments:MULTI-DRAWER FILE CABINETS: (2 to 5 Drawers)

(a) Letter size -----

(b) Legal size -----

Comments:

NUMBER
AVAILABLE

NUMBER
RECOMMENDED

OFFICE storage (Continued)

OTHER CABINETS:

(a) Wooden: Size

width	depth	height

(b) Metal: Size

width	depth	height

Comments:

CLOSETS OR SEPARATE ROOMS:

--

 sq. ft. -----

Comments:

Please explain other storage in your OFFICE.

NUMBER
AVAILABLE

NUMBER
RECOMMENDED

	□	□
	□	□
	□	□
	□	□
	□	□
	□	□
	□	□
	□	□

DRAFTING ROOM STORAGE
(ONLY the one you are evaluating)

BOOK CASES:

(a) Size:

width	height

(b) Number of shelves (Total for all book cases)-----

Comments:**FLAT FILES:**

(a) Size:

width	depth	height

(b) Number of drawers (Total) -----

Comments:**MULTI-DRAWER FILE CABINETS: (2 to 5 Drawers)**

(a) Letter size -----

(b) Legal size -----

Comments:

NUMBER
AVAILABLE

NUMBER
RECOMMENDED

DRAFTING ROOM storage (Continued)

OTHER CABINETS:

(a) Wooden: Size

width	depth	height

(b) Metal: Size

width	depth	height

Comments:

CLOSETS OR SEPARATE ROOMS:

sq. ft.

Comments:

Please explain other DRAFTING ROOM storage.

 NUMBER
AVAILABLE
 NUMBER
RECOMMENDED

☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐

DEPARTMENTAL STORAGE
(To be completed by the director)

BOOK CASES:

(a) Size: -----
width height

(b) Number of shelves (Total for all book cases) ----

Comments:

FLAT FILES:

(a) Size: -----
width depth height

(b) Number of drawers (Total) ----

Comments:

MULTI-DRAWER FILE CABINETS: (2 to 5 Drawers)

(a) Letter size ----

(b) Legal size ----

Comments:

NUMBER
AVAILABLE

NUMBER
RECOMMENDED

DEPARTMENTAL storage (Continued)

OTHER CABINETS:

(a) Wooden: Size -----
 width depth height

(b) Metal: Size -----
 width depth height

Comments:

CLOSETS OR SEPARATE ROOMS: sq. ft. -----

Comments:

Please explain other DEPARTMENTAL storage.

NUMBER
AVAILABLE

NUMBER
RECOMMENDED

**AUDIO-VISUAL
AND
REPRODUCING
EQUIPMENT**



D

AUDIO-VISUAL AND REPRODUCING EQUIPMENT

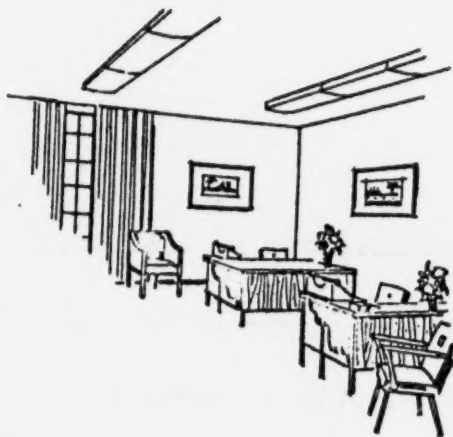
Directions: Please indicate the number of each item that is AVAILABLE and also the number that you RECOMMEND of each item.

Please note: The number that you put in the NUMBER RECOMMENDED column should represent the total number recommended. Please place a zero in the NUMBER AVAILABLE column if none are available. (Office equipment is covered in another section.)

- (NUMBER per DEPARTMENT)
1. 16 mm projector -----
 2. 8 mm projector -----
 3. Overhead projector -----
 4. Filmstrip projector -----
 5. Slide projector -----
 6. Projection screen -----
 7. Opaque projector -----
 8. TV monitor -----
 9. TV camera -----
 10. Tape recorder -----
 11. Record player -----

	NUMBER AVAILABLE	NUMBER RECOMMENDED
1. 16 mm projector -----	☐	☐
2. 8 mm projector -----	☐	☐
3. Overhead projector -----	☐	☐
4. Filmstrip projector -----	☐	☐
5. Slide projector -----	☐	☐
6. Projection screen -----	☐	☐
7. Opaque projector -----	☐	☐
8. TV monitor -----	☐	☐
9. TV camera -----	☐	☐
10. Tape recorder -----	☐	☐
11. Record player -----	☐	☐

	NUMBER AVAILABLE	NUMBER RECOMMENDED
12. 35 mm camera -----	☐	☐
13. 35 mm copy stand -----	☐	☐
14. Moist diazo (blue print) -----	☐	☐
15. Dry diazo (white print) -----	☐	☐
16. Micro-filming camera -----	☐	☐
17. Micro-film reader -----	☐	☐
18. Blueprint machine -----	☐	☐
19. Public address system -----	☐	☐
20. Ditto machine -----	☐	☐
21. Mimeograph machine -----	☐	☐
22. Thermo-Fax -----	☐	☐
23. Xerox -----	☐	☐
24. Paper cutter -----	☐	☐
<u>List other items:</u>	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐



ADMINISTRATIVE FACILITIES

E

ADMINISTRATIVE FACILITIES

Directions: Please answer the questions with a word, a number, an "X", or by placing A, B, C, or D in the appropriate spaces at the right. Answer the questions in terms of departmental recommendations.

Please note: When a number is requested in the RECOMMENDED space, it should represent the total number recommended. Please place a zero in the PRESENT FACILITIES space if none are available.

1. Instructor's office

a. Do you have a private office? ----- ☐ Yes ☐ No

b. Do you recommend a private office for each instructor? ----- ☐ Yes ☐ No

c. If your office is not private, you share with how many people? -----

d. If you have an office, where is it located?
 (A) Next to the drafting room (B) Part of the drafting room
 (C) Centrally located with other instructor's offices
 (D) Other (specify)

Present facilities -----

Recommended facilities -----

e. If you have an office, what are its dimensions?

Present facilities ----- ft. X ft.

Recommended facilities ----- ft. X ft.

2. Office machines and equipment

a. Do you have a typewriter in your office? -----

b. Do you have an adding machine in your office? -----

c. Do you have a calculator in your office? -----

d. Do you have a telephone in your office? -----

e. Do you have an intercom system other than telephones? -----

f. Do you have a drafting table in your office in addition to your desk? -----

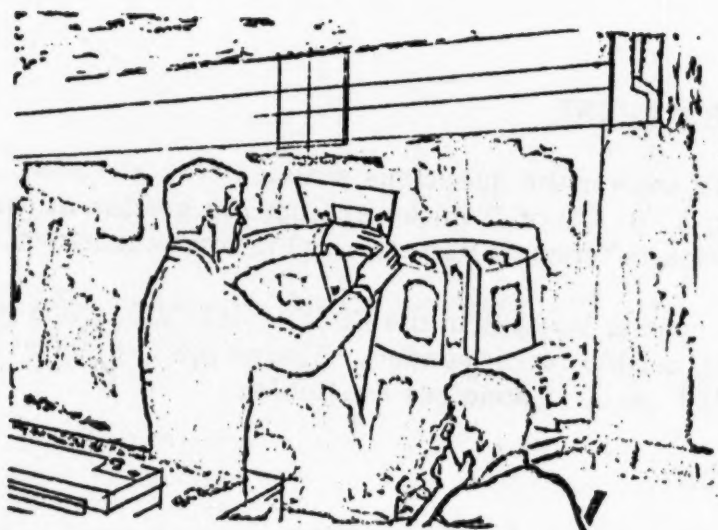
YES

NO

NEEDED

NOT NEEDED

3. List other office facilities that you have and/or recommend.



EDUCATIONAL ENRICHMENT

F

EDUCATIONAL ENRICHMENT

Directions: Please answer the questions with a word, a number, an "X", or by placing A, B, C, or D in the appropriate spaces at the right. Answer the questions in terms of departmental recommendations.

Please note: The number you put in the RECOMMENDED space should represent the total number recommended. Please place a zero in the PRESENT FACILITIES space if none are available.

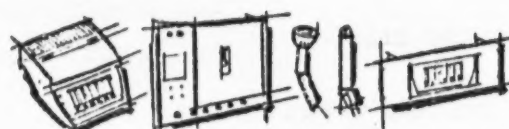
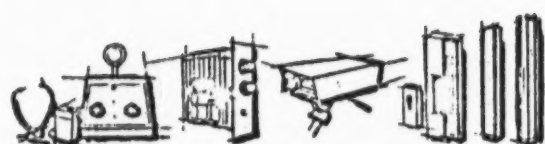
1. Drafting library

- a. Does the department have a drafting library? ----- ☐ Yes ☐ No
- b. Do you recommend a departmental drafting library? ----- ☐ Yes ☐ No
- c. If the department has a library, approximately how many books does it contain? -----
- d. If the department has a library, where is it located?
 (A) Drafting room (B) Departmental office (C) Separate room
 (D) Other (specify) _____

Present facilities ----- Recommended facilities ----- 2. Display cases

- a. Number of display cases in the drafting
- department
- ?

Present facilities ----- Recommended facilities -----



SPECIAL FACILITIES

G

SPECIAL FACILITIES

Directions: Place an "X" in either the "Yes" or "No" column and briefly explain the facilities of the drafting department. Also add your suggestions and recommendations for improvement.

1. Does the department have provisions for the physically handicapped? (Elevator service, ramps, etc.)

☐ Yes☐ No

Briefly explain:

2. Does the department have facilities for individual or small group study?

☐ Yes☐ No

Briefly explain:

3. Explain other special facilities.



**SUGGESTIONS
AND
RECOMMENDATIONS**

H

SUGGESTIONS AND RECOMMENDATIONS

Directions: Briefly discuss the following questions by making suggestions and recommendations that would be helpful in remodeling or building new facilities.

1. What drafting facilities in your program are in the most urgent need of improvement?

2. What building and equipment changes in the drafting department will take place within the next five to ten years?

3. What building and equipment changes should take place within the next five to ten years?

Five Years:

Ten Years:

4. What facilities do you especially like or dislike about your program?

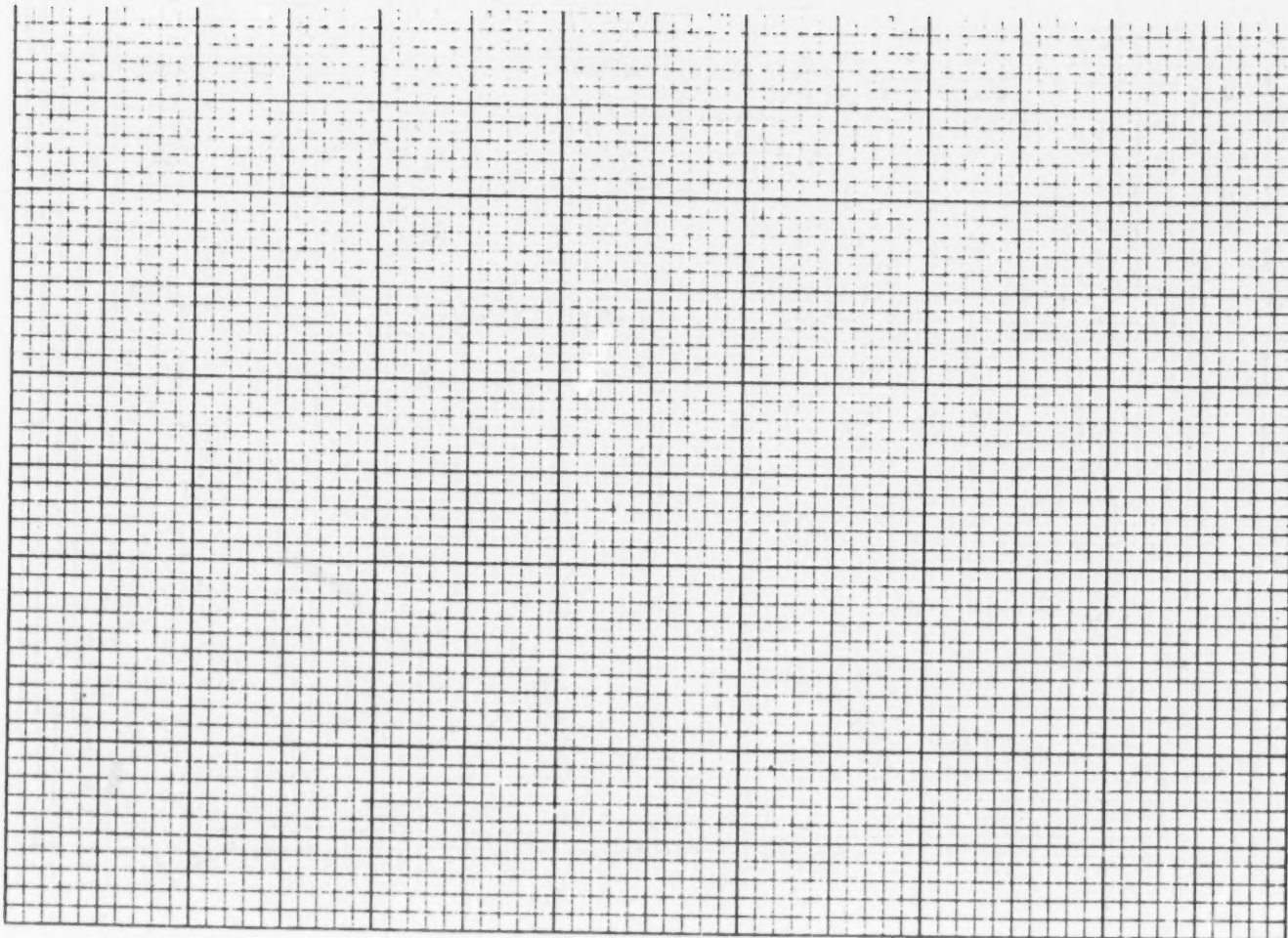
Like:

Dislike:

5. Other suggestions and recommendations which should be considered in building or remodeling facilities.

NOTE:

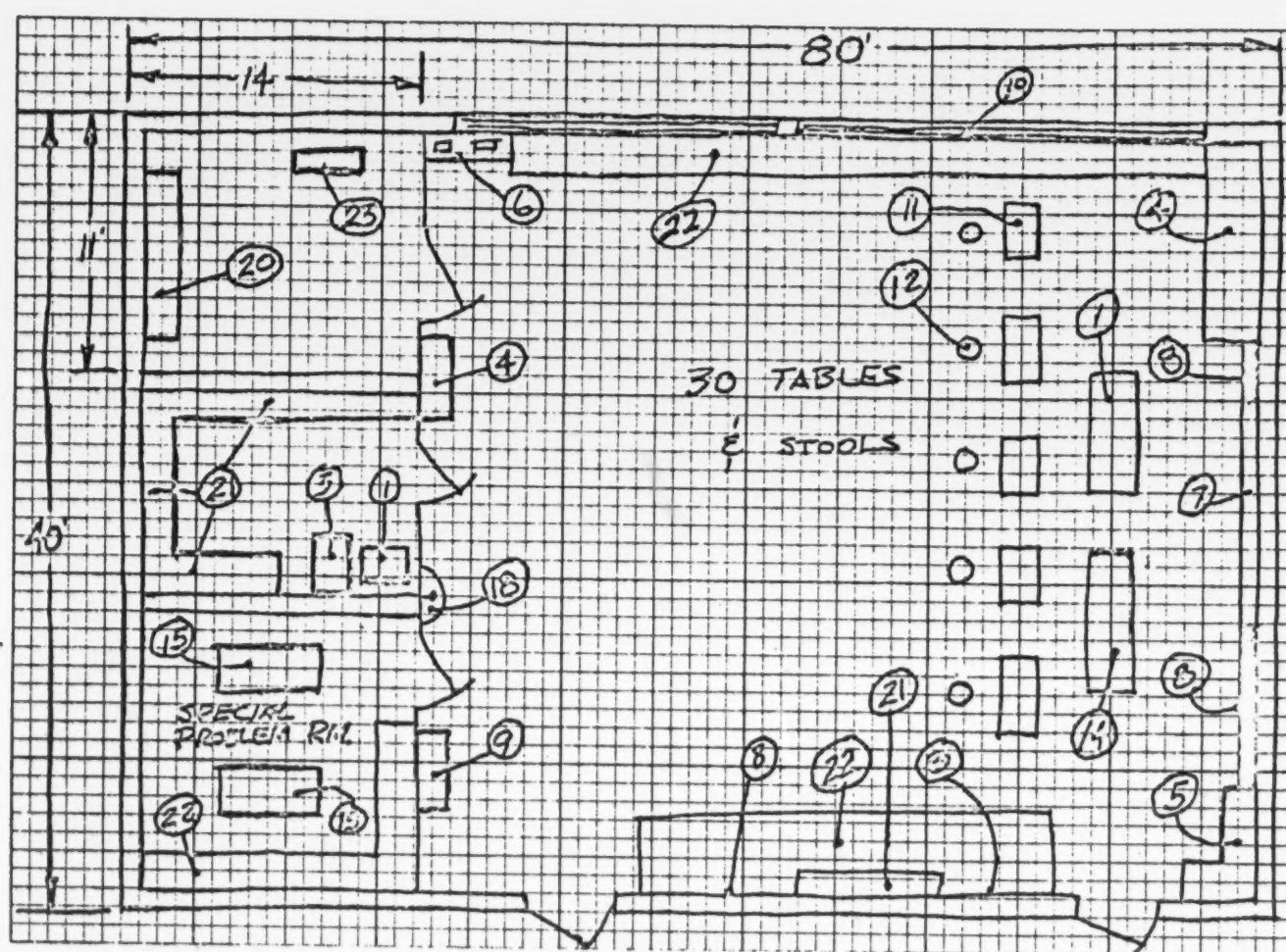
Please check your answers to see that you have responded to each item by indicating YES or NO, NEEDED or NOT NEEDED, and also indicating what EXISTS and what you RECOMMEND.



DIRECTIONS: Please SKETCH the floor plan of the drafting room that you are evaluating. Below are some suggested items that might be in the drafting room. Place the number of the item on the plan. (Note example on next page.)

- | | |
|---------------------------------|----------------------------|
| 1. Teacher's Desk | 14. Demonstration Table |
| 2. Teacher's Closet or Wardrobe | 15. Table |
| 3. File Cabinet | 16. Door |
| 4. Storage (General) | 17. Rest Room |
| 5. Student Storage & Book Rack | 18. Drinking Fountain |
| 6. Wash Basin | 19. Fire Extinguisher |
| 7. Chalk Board | 20. Reproduction Equipment |
| 8. Cork or Bulletin Board | 21. Drafting Library |
| 9. Display Case | 22. Counter |
| 10. Windows | 23. Sink |
| 11. Drafting Tables | 24. (Other) _____ |
| 12. Drafting Stool | 25. (Other) _____ |
| 13. Drafting Chairs | 26. (Other) _____ |

Please give over-all dimensions.



EXAMPLE

DIRECTIONS: Please SKETCH the floor plan of the drafting room that you are evaluating. Below are some suggested items that might be in the drafting room. Place the number of the item on the plan.

- | | |
|---------------------------------|----------------------------|
| 1. Teacher's Desk | 14. Demonstration Table |
| 2. Teacher's Closet or Wardrobe | 15. Table |
| 3. File Cabinet | 16. Door |
| 4. Storage (General) | 17. Rest Room |
| 5. Student Storage & Book Rack | 18. Drinking Fountain |
| 6. Wash Basin | 19. Fire Extinguisher |
| 7. Chalk Board | 20. Reproduction Equipment |
| 8. Cork or Bulletin Board | 21. Drafting Library |
| 9. Display Case | 22. Counter |
| 10. Windows | 23. Sink |
| 11. Drafting Tables | 24. (Other) _____ |
| 12. Drafting Stool | 25. (Other) _____ |
| 13. Drafting Chairs | 26. (Other) _____ |

Please give over-all dimensions.

APPENDIX C--The Industrial Survey

Sample Letters and Enclosures

Sample Survey Questionnaire

Subject Rating Summaries

Salary Summaries

Statistical Formulas

SAMPLE LETTER
REQUESTING AID FROM CHAMBERS OF COMMERCE

Gentlemen:

We are engaged in a basic research effort under the sponsorship of the Texas Education Agency to determine industrial requisites for curriculum content in drafting technology programs. Essential employment qualifications for drafting personnel will be identified through an industrial survey. The resulting industrial recommendations will be compared to the curriculum content of current technical programs to determine if these programs are realistically preparing graduates for industrial employment. The ultimate goal of our project is the publication of a planning guide to implement and upgrade drafting technology education throughout the State.

Could you furnish us with a list of the names and addresses of industrial concerns in your area which employ a significant number of draftsmen?

The success of this project depends to an extent on compiling a list of industrial concerns that will be representative of the industrial picture in Texas.

Your assistance will be greatly appreciated.

Sincerely,

Harry W. Walston

SAMPLE
PRE-QUESTIONNAIRE LETTER

Dear _____:

Thank you for your letter of _____ (date) in response to our request for information about Company drafting standards. Your comments were interesting and informative as was the enclosed material.

We have compiled a brief questionnaire to give us some basis for determining course requirements according to industrial needs for prominent areas of specialization. It may also suggest areas of concentration neglected by technical drafting education programs.

We would like to enlist your help in asking you to complete the items applicable to your firm on the enclosed questionnaire. A stamped, self-addressed envelope is provided for your convenience.

Sincerely,

Harry W. Walston
Principal Investigator

SAMPLE LETTER OF INVITATION

Dear _____:

We are engaged in a basic research effort under the sponsorship of the Texas Education Agency to determine industrial requisites for curriculum content in drafting technology programs. Essential employment qualifications for drafting personnel will be identified through an industrial survey. The resulting industrial recommendation will be compared to the curriculum content of current technical programs to determine if these programs are realistically preparing graduates for industrial employment. The ultimate goal of our project is the publication of a planning guide to implement and upgrade drafting technology education.

You are invited to participate in the research project by responding to the survey questionnaire. Your responses will be of assistance in upgrading current drafting technology programs and consequently result in more qualified graduates for industrial employment with companies such as yours.

Please indicate your willingness to answer the questionnaire on the enclosed reply form and return via the provided self-addressed envelope. Your cooperation will be greatly appreciated.

Sincerely,

Harry W. Walston

Reply Form

Please indicate your willingness to be a survey respondent by placing a check ☒ in the appropriate space.

☐ I am willing to participate in the survey.

☐ I am unable to participate in the survey.

Company _____

Address _____

_____ Zip Code _____

Respondent _____

Description of Questionnaire

Each questionnaire will include a "General Information" section (28 questions) to be completed by a company representative concerned with drafting personnel qualifications. The other sections of the information forms have been designed to relate to definite areas of specialization and are to be completed by "drafting specialists" from specified areas. Respondents for the "specialty areas" will assess the importance of suggested instructional topics by placing checkmarks in the appropriate positions on a rating scale.

NOTE: If you intend to be a survey respondent, please indicate on the checklist of job titles the drafting specialists employed by your company so that we will be able to mail you a questionnaire oriented to the needs of your particular company.

- ☐ Aeronautical Draftsman
- ☐ Architectural Draftsman
- ☐ Civil Draftsman
- ☐ Computer Draftsman
- ☐ Electrical Draftsman
- ☐ Foundry Draftsman
- ☐ Map Draftsman

- ☐ Mechanical Draftsman
- ☐ Tool Design Draftsman
- ☐ Piping Draftsman
- ☐ Sheet Metal Draftsman
- ☐ Structural Draftsman
- ☐ Technical Illustrator
- ☐ Other _____

SAMPLE
LETTER OF TRANSMITTAL

Dear _____:

Enclosed is the survey questionnaire mentioned in previous correspondence. Our objective is to determine industrial requisites for instructional topics in drafting technology programs. The ultimate goal of our project is the publication of a planning guide to implement and upgrade junior college drafting and design programs.

The general information section of the survey questionnaire should be completed by a company representative concerned with drafting personnel qualifications. The other sections of the information form relate to definite areas of drafting specialization. We have mailed you only the specialty areas that are applicable to your company. It is suggested that these forms be completed by area specialists. Directions for completing these forms are included with each booklet.

Our main concern in designing the information forms was to minimize the time and effort required to complete the questionnaire. We solicit your comments and suggestions. Please feel free to make any comments that would improve the quality and effectiveness of our research.

Please return the completed forms in the self-addressed envelope. We appreciate the time and effort you have devoted to this project.

Sincerely,

Harry W. Walston

SAMPLE
FOLLOW-UP LETTER

Dear _____:

A busy work schedule and priority assignments probably have prevented you from answering the survey questionnaire that was mailed you several weeks ago. We hope that it will be possible to schedule time in the near future to answer the questionnaire as the data from your company is vital to the implementation of a realistic training program in drafting technology.

Your data will be translated into relevant guidelines to enable junior colleges to structure their technology programs to train more qualified and productive personnel for employment in industrial concerns such as yours.

We are looking forward to receiving your recommendations, and the implications they will have on these guidelines.

Sincerely,

Harry W. Walston

CURRICULUM DESIGN GUIDE

The following job descriptions have been condensed from the Dictionary of Occupational Titles and are potential job areas for drafting technology program graduates. Please check ☒ in the appropriate space, all classifications applicable to your firm. If relevant categories have not been provided, please specify the job area or title in a space under the most applicable classification. A brief description of the classification will be appreciated.

☐ GENERAL DRAFTSMAN

Exercises manual skill in the manipulation of drafting instruments. Prepares pencil or ink tracings, working drawings, revisions, detailed sketches or notes for engineering or manufacturing purposes, according to specifications: Makes final sketch of proposed drawing, checking dimensions, construction materials, and the structural relationships of components. Produces reproductions, charts representing statistical data, or finished designs from sketches. Utilizes machine knowledge, engineering practices, strength of materials, and other physical sciences to complete assignments.

☐ _____
☐ _____

CLASSIFICATIONS ACCORDING TO TYPE OF DRAFTING

☐ AERONAUTICAL DRAFTSMAN

Specializes in engineering drawings of developmental or production aircraft, missiles, and ancillary equipment including launch mechanisms and scale models of prototype aircraft, as planned by aeronautical engineer.

☐ _____
☐ _____

☐ MARINE DRAFTSMAN

Specializing in marine design.

☐ _____

☐ DESIGN DRAFTSMAN

Produces design drawings and assists in developing experimental ideas evolved by research engineers. Solves mechanical and fabrication problems through sketches and applications of engineering theory.

☐ ELECTRONIC DRAFTSMAN

Produces wiring and logic diagrams, schematics and layout drawings used in the manufacture, assembly, installation and repair of electronic equipment. Drafts layout and detail drawings of racks, panels and enclosures. May conduct service and interference studies and prepare related charts.

- ☐ RADIO DRAFTSMAN
- ☐ ELECTRONIC DRAFTSMAN
- ☐ ELECTRICAL DRAFTSMAN

Prepares electrical equipment working drawings and wiring diagrams used by construction crews and repairmen who install, erect, and repair electrical equipment and wiring in structures, buildings, or electrical distribution systems.

☐ MECHANICAL DRAFTSMAN
☐ _____
☐ _____

☐ MECHANICAL DRAFTSMAN (Engineering Draftsman)

Produces detailed working drawings or schematics of machinery and mechanical devices. Indicates dimensions, tolerances, fasteners and fabrication requirements and other engineering data.

☐ _____
☐ _____

☐ TOOL DESIGN DRAFTSMAN

Specializes in plans for tool manufacturing, usually follows indicated designs and specifications of tool designer. Utilizes a detailed knowledge of machine shop practice.

☐ SHEET METAL DRAFTSMAN

Prepares scale layouts of sheet metal parts for installation of conveyor systems, air-conditioning, heating, or ventilating equipment. Often required to mathematically establish the heat loss or gain, and volume capacities for conveyor or duct systems to determine equipment specifications for structures.

☐ _____
☐ _____

☐ FOUNDRY DRAFTSMAN

Prepares drawings for castings which calls for special pattern making knowledge requiring attention to shrinking allowances and such factors as minimum radii of fillets and rounds.

☐ _____
☐ _____

☐ CIVIL DRAFTSMAN

Drafts detailed construction drawings, topographical profiles, and related maps and specification sheets used in planning and construction of highways, river and harbor improvements, flood control, sewage and drainage systems, and other civil engineering projects. Plots maps and charts showing profiles and cross sections, indicating relation of topographical contours and elevations to buildings, retaining walls, tunnels, powerlines and other structures. Drafts detailed drawings of roads, culverts, water supply and sewage disposal systems, dykes and other structures and installations. Calculates cut and fills tonnage. Prepares graphs and diagrams used in earthmoving operations. Works with field survey crews locating grading markers or collecting required data for original or revised drawings.

- ☐ CIVIL ENGINEERING DRAFTSMAN
- ☐ CONSTRUCTION DRAFTSMAN
- ☐ ENGINEERING DRAFTSMAN

☐ _____
☐ _____

☐ _____
☐ _____

☐ OIL AND GAS DRAFTSMAN

Makes drawings for layout, construction, and operation of oil fields, refineries and pipeline systems from field notes and rough or detailed sketches and specifications. Details equipment and structure construction drawings for derricks, compressor stations, gasoline plants, pipeline systems, or commercial buildings. Develops maps to represent geological stratigraphy and locations of oil and gas deposits by utilizing geological and geophysical prospecting and surveying data. Works with data required for petroleum production.

- ☐ ARCHITECTURAL DRAFTSMAN
- ☐ MECHANICAL DRAFTSMAN
- ☐ PIPING DRAFTSMAN
- ☐ TOPOGRAPHICAL DRAFTSMAN
- ☐ GEOLOGICAL DRAFTSMAN
- ☐ GEOPHYSICAL DRAFTSMAN

☐ _____
☐ _____

☐ STRUCTURAL DRAFTSMAN

Prepares engineering design and shop drawings for structures employing structural steel, reinforced or prestressed concrete, or timber members.

- ☐ STRUCTURAL STEEL DRAFTSMAN
- ☐ REINFORCED CONCRETE DRAFTSMAN
- ☐ PRESTRESSED CONCRETE DRAFTSMAN
- ☐ TIMBER CONSTRUCTION DRAFTSMAN

☐ _____
☐ _____

☐ PHOTOCARTOGRAPHER

Originates or revises topographical maps from surveying notes, records, or aerial photographs. May work with field crew to

compile original survey data or to locate natural or manmade landmarks.

☐ _____
☐ _____

☐ MAP DRAFTSMAN (CARTOGRAPHER, MAPPER, MAP MAKER)

Delineates topographical drawings, identifies and locates roads, communities, structures, and installations. Analyzes survey data and other records to determine location of natural or manmade features. Studies legal records to establish boundary lines of specified areas. May originate or revise maps related to commercial or industrial property.

- ☐ GEOLOGICAL DRAFTSMAN
☐ TOPOGRAPHICAL DRAFTSMAN

☐ _____
☐ _____

Company Name _____

Address _____

Respondent _____

Name
Title

Would you be willing to participate in a more detailed survey scheduled for this summer. Yes ☐ No ☐



DRAFTING TECHNOLOGY STUDY

1969-1970

General Information Section

☼ respondent _____ title _____
PLEASE PRINT

☼ specialties represented

plant location ☼

☐ Aeronautical Draftsman

☐ Architectural Draftsman

☐ Civil Draftsman

☐ Computer Draftsman

☐ Electrical Draftsman

☐ Foundry Draftsman

☐ Map Draftsman

☐ Mechanical Draftsman

☐ Tool Design Draftsman

☐ Piping Draftsman

☐ Sheet Metal Draftsman

☐ Structural Draftsman

☐ Technical Illustrator

☐ Other _____



East Texas

☐


North Central Texas

☐


Central Texas

☐


The Panhandle-Plains

☐


West Texas

☐


South Texas-Gulf Coast

☐

Out-of-State

☐

1. How many people are employed by your company?
2. How many employees are classified as drafting personnel?
3. How many women are employed in a drafting capacity?
4. When your company recruits additional drafting personnel is "Want Ad" advertising necessary? Yes ☐ No ☐
5. Is "Want Ad" advertising for drafting personnel conducted:
Locally ☐ Statewide ☐ Out-of-state ☐
6. Does your company test applicants for drafting positions to establish aptitudes or qualifications for employment? Yes ☐ No ☐
7. Please indicate the type of tests used in testing program.

A. Reasoning ability	☐	E. Verbal ability	☐
B. Numerical ability	☐	Other: (Please Specify)	
C. Mechanical insight	☐	F. _____	
D. Spatial visualization	☐	G. _____	
8. The minimum background required of your draftsmen:

A. No formal drafting training	☐	D. Junior college drawing courses	☐
B. High school drawing courses	☐	E. College drawing courses	☐
C. Military service dftg. training	☐	F. Other: _____	
9. Does your company sponsor any type of required formal training or on-the-job educational classes for drafting personnel? Yes ☐ No ☐

A. Formal classroom instruction	☐	C. Practical board work	☐
B. Programmed learning	☐	D. Other: _____	
10. What specific instructional areas are covered by your company's OJT program?

11. Please list textbooks used in on-the-job training?

Text	Author
_____	_____
_____	_____
12. How many hours per week are devoted to on-the-job training?
13. Please specify the interval of time allotted for your company's on-the-job training program.
Years _____ Months _____ Weeks _____ Days _____
14. Is there a definite need in industry for graduates of a two-year drafting technology program? Yes ☐ No ☐

15. Does your company operate any type of apprenticeship program for the accepting, counseling, and training of drafting personnel at entry level?

Yes ☐ No ☐

16. Please specify the grade levels used by your company and the approximate monthly salaries by code letter in each category.
Example: trainee, detailer, draftsman, designer, etc.

Job Titles	Starting Salary ACCODE	Average Salary ACCODE	Maximum Salary ACCODE
1.			
2.			
3.			
4.			
5.			
6.			
7.			

CODE	
A	Under \$400
B	\$400 to \$567
C	\$567 to \$734
D	\$734 to \$900
E	Over \$900

17. Please indicate in the following chart the present number of draftsmen employed in the relevant areas, the projected drafting needs for two and four years, and the approximate number of employees that leave drafting positions for any reason in one year's time. (Yearly turnover)

	Presently Employed	Projected Needs		Yearly Turnover
		2 Years	4 Years	
Aeronautical				
Architectural				
Computer				
Civil				
Electrical				
Electronic				
Electro-mechanical				
Foundry				
Map				
Mechanical				
Piping				
Structural				
Technical Illustrator				
Tool Design				

18. Are students or graduates of junior college drafting technology programs employed by your company.

Yes ☐ No ☐

19. How many credit hours of junior college instruction are drafting employees required to take to supplement your company's on-the-job training program?

20. In which drafting technology specialties are drafting technology graduates most proficient? _____
21. In which drafting technology specialties are drafting technology graduates least proficient? _____
22. What is the approximate mileage from your company to the nearest state supported junior college or technological institute?
- | | | |
|----------------------------------|----------------------------------|----------------------------------|
| Under 5 ☐ | 5 - 15 ☐ | 15 - 25 ☐ |
| 25 - 35 ☐ | 35 - 45 ☐ | Over 45 ☐ |
23. Have junior college representatives submitted requests to your company for assistance in planning curriculums for area vocational programs? Yes ☐ No ☐
24. Do you think your company would be receptive to hosting industrial field trips for technology classes? Yes ☐ No ☐
25. Do you think your company would be receptive to participating in workshops to upgrade or implement junior college instructions? Yes ☐ No ☐
26. Please list qualified company representatives who would be receptive to serving as a guest lecturer, resource consultant, or in some advisory capacity to local junior college technology programs.
- _____
- _____
27. Do you desire a summary of this research? Yes ☐ No ☐
28. Please attach to this questionnaire a copy of the "application for employment" form used for drafting personnel.

NOTE: In order to minimize the work load and to expedite the completion of the information form, the other sections of this information form have been designed to pertain to definite areas of specialization and should be completed by a "drafting specialist" for each specified area.

Please collect all sections of the information form from the area specialists and return to:

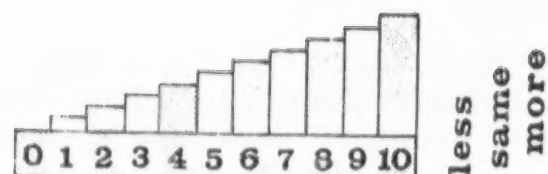
HARRY W. WALSTON
DEPARTMENT OF ENGINEERING GRAPHICS
TEXAS A&M UNIVERSITY
COLLEGE STATION, TEXAS 77843

GENERAL DRAFTSMAN--These items are considered to be common to most areas of drafting technology regardless of specialty. These are to be rated as they relate to your particular area of specialization.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Use of scales														
a. Decimal														
b. Engineers														
c. Architectural														
e. Metric														
2. Use of dftg. machines, triangles, tools														
3. Application of line conventions														
a. Speed of execution														
b. Skill of application														
c. Skill in use of pencil														
d. Inking skill														
4. Use & treatment of std. abbreviations														
5. Ability to letter														
a. Use mechanical lettering devices														
b. Speed in lettering														
c. Perfection in lettering														
6. Ability to make freehand sketches														
7. Understanding of multiview projection														
8. Apply simplified drawing practices														
9. Use geometric construction														
a. Use of graphical math & vectors														
10. Application of dimensioning practices														
a. Use of fractional dimensioning														
b. Application of decimal methods														
c. Specify tolerances & fits														
d. Treatment of true positioning														
e. Specify surface texture & finishes														
f. Dimensioning for numerical control														
11. Knowledge of shop processes														
a. Machine shop operations														
b. Forge shop operations														
c. Pipe shop operations														
d. Weld shop operations														
e. Electric shop operations														

GENERAL DRAFTSMAN--Continued

12. Recognition of reproduction media
 a. Blueprint - white line
 b. Sepias - brown line
 c. Diazo - blue line
 d. Xerography - black line
 e. Offset printing
 f. Van Dyke prints
 g. Microfilm
13. Application of short cut dftg. methods
 a. Use tracing grads & guides
 b. Use drawing templates
14. Understand sections & conventions
15. Use & treatment of auxiliary views
16. Use revolution for problem solving
 a. Determination of true length
 b. True size of inclined surfaces
 c. Clarification of drawings
17. Solve developments & intersections
18. Representation of threads & fasteners
 a. Use detailed representation
 b. Use schematic representation
 c. Use simplified representation
 d. Application of welding symbols
 e. Application of riveting symbols
19. Lay out working drawings
20. Preparation of assembly drawings
21. Ability to make drawing revisions
22. Use models & model construction
 a. For design analysis
 b. For sales presentation
23. Ability to make pictorial drawings
 a. Prepare exploded pictorials
 b. Prepare isometric pictorials
 c. Prepare dimetric pictorials
 d. Prepare trimetric pictorials
 e. Prepare oblique pictorials
 f. Prepare perspective pictorials
 g. Prepare renderings



GENERAL DRAFTSMAN--Continued

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
24. Application of design processes														
a. For individual project														
b. For systems or group projects														
25. Develop charts, graphs, & nomograms														
26. Lay out flow & critical path diagrams														
27. Calculate & specify cams & gears														
28. Problem solving by descriptive geometry														
a. Piercing points of lines & planes														
b. Dihedral angles														
c. Perpendicularity of lines/planes														

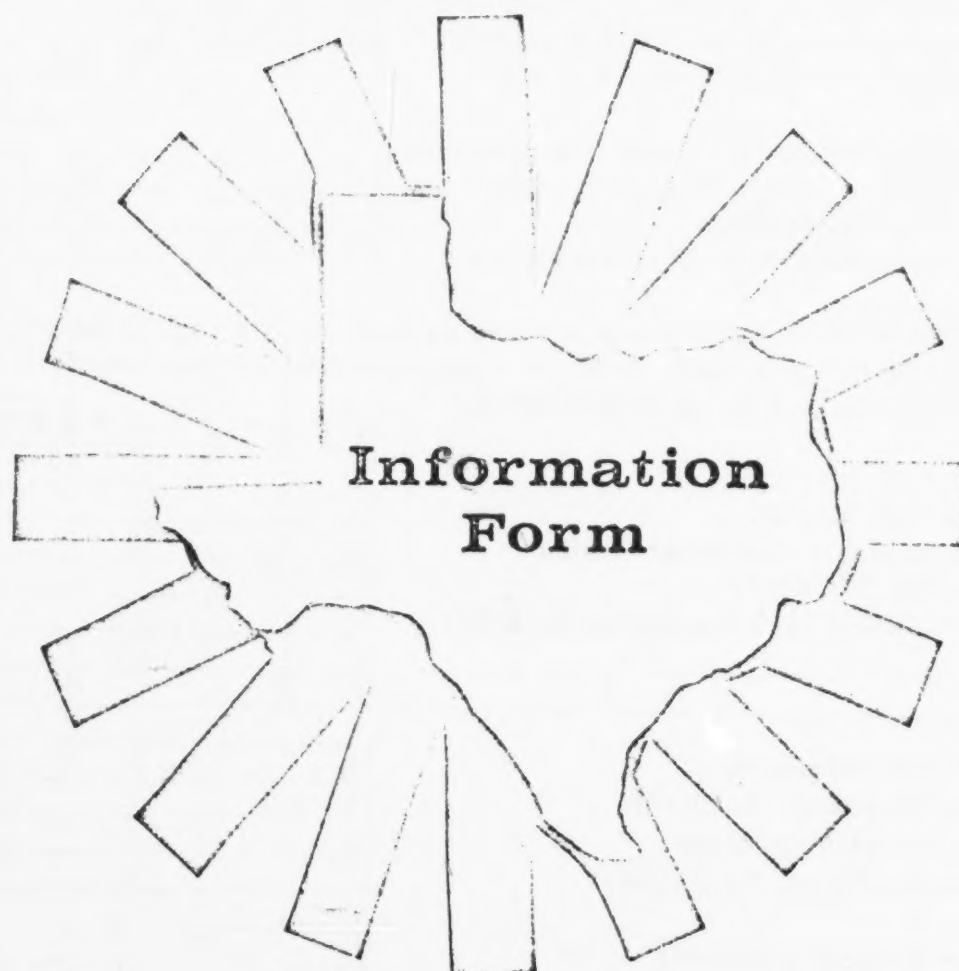
STANDARDS--Please rate these standards as they pertain to your particular specialty. If relevant standards have not been provided, please specify and rate the additional standard in the provided space.

	0	1	2	3	4	5	6	7	8	9	10	
1. Use AISC Manual												
2. Use CRSI Manual												
3. Use Smoley's Combined Tables												
4. Use ASA Standards												
a. USASI-Y 14.5 Dimensioning & Tol.												
b. _____												
c. _____												
5. Use SAE Standards												
6. Use "Company Standards"												
7. Use Sweet's Catalogs												
8. Use Machinery Handbooks												
9. Use Military Standards												
a. _____												
b. _____												
c. _____												

Drafting Technology Study

Aeronautical Drafting Section

Respondent _____



1969 - 1970

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AERONAUTICAL DRAFTSMAN -- Specializes in engineering drawings of developmental or production aircraft, missiles, and ancillary equipment including launch mechanisms and scale models of prototype aircraft, as planned by aeronautical engineers.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Understanding of orthographic projection														
a. Use simplified drafting practices														
b. Orthographic conversion to isometric														
c. Isometric conversion to orthographic														
d. Knowledge of blueprint reading														
2. Prepare engineering drawings from:														
a. Freehand sketches														
b. Scale drawings														
c. Constructed models														
d. Verbal/oral instructions														
3. Solve trigonometry problems														
4. Solve mechanism & kinematics problems														
5. Understanding of dimensioning theory														
6. Use geometric tolerances														
a. Specify flatness														
b. Specify straightness														
c. Specify roundness														
d. Specify cylindricity														
e. Specify profile of any line														
f. Specify profile of any surface														
g. Specify parallelism														
h. Specify perpendicularity														
i. Specify angularity														
j. Specify runout														
k. Specify true position														
l. Specify concentricity														
m. Specify symmetry														
7. Understanding of shop practices														
a. Specify heat treatment														
b. Specify drilling operations														
c. Representation of fasteners														
1. Bolts														
2. Rivets														
8. Use welding theory & symbology														

AERONAUTICAL DRAFTSMAN -- Continued

9. Use datum planes
10. Prepare instrumentation drawings
11. Drafting for microfilm reproduction
12. Prepare sections & conventions
13. Prepare auxiliary views.

14. Use descriptive geometry
15. Solve intersections
16. Layout developments
 - a. Single-curved surfaces
 - b. Double-curved surfaces

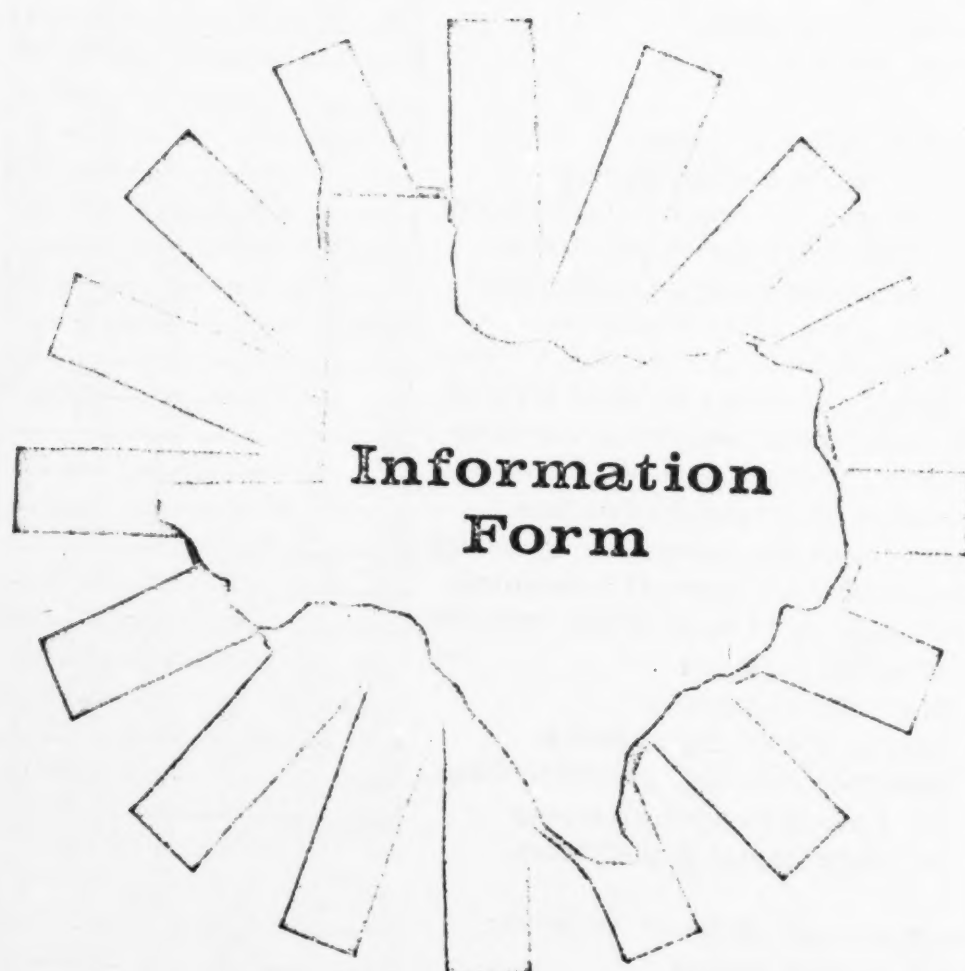
	0	1	2	3	4	5	6	7	8	9	10	less	same	more

NOTE: If relevant topics have not been provided, please specify and rate the additional items in the provided space. This space may also be used for your suggestions and comments.

Drafting Technology Study

Architectural Drafting Section

Respondent _____



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ARCHITECTURAL DRAFTSMAN -- Specializes in the delineation of the architectural and structural features of any class of building and like structures.

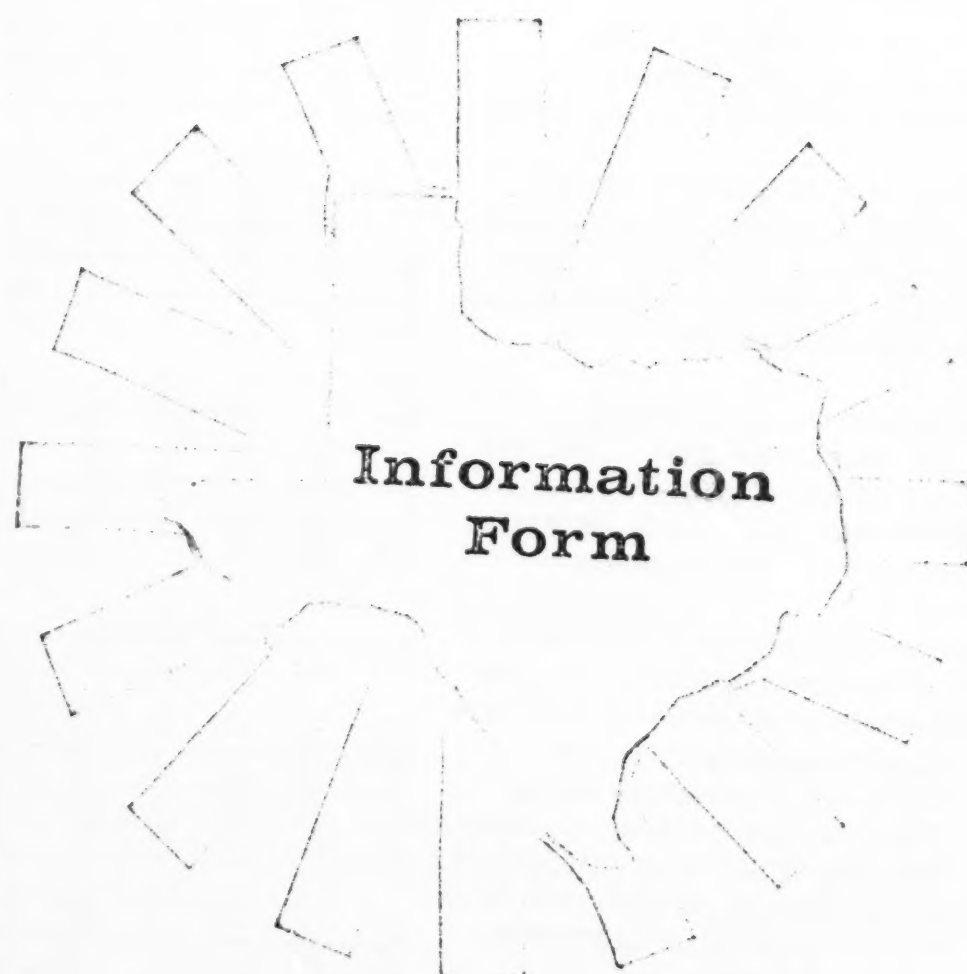
	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Know history of architecture														
a. Recognition of architectural styles														
2. Use architectural symbols														
3. Architectural lettering skill														
4. Understanding of orthographic projection														
5. Preparation of architectural details														
a. Site plan details														
b. Foundation plans & details														
c. Floor plans														
d. Elevations & sections														
e. Framing plans & details														
6. Knowledge of building codes														
a. Ability to write specifications														
b. Understanding of legal considerations														
c. Detail and inspect site preparation														
1. Understand dredging operations														
2. Detail & specify earthwork														
3. Landscaping implications & plans														
4. Detail industrial railroad layouts														
d. Know moisture protection procedures														
e. Use door, window & glass standards														
f. Knowledge of industrial finishes														
g. Knowledge of equipment arrangements														
h. Knowledge of commercial furnishing														
i. Understanding of mechanical systems														
1. Electrical layouts														
2. Mechanical layouts														
3. Layout conveying systems														
4. Heating, cooling, plumbing dwgs.														
a. Isometric configurations														
b. Sheet metal & duct work														
7. Knowledge & application of materials														
a. Detail asphalt paving														
b. Detail reinforced concrete														
c. Detail prestressed concrete														
d. Detail structural steel														
e. Detail miscellaneous metals														

ARCHITECTURAL DRAFTSMAN -- Continued

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
8. Understanding of area planning														
a. Responsibility for interior planning														
b. Responsibility for exterior planning														
9. Use critical path schedules														
a. Prepare planning phase														
b. Prepare scheduling phase														
c. Supervise construction phases														
10. Ability to prepare cost estimates														
11. Ability to do cost accounting														
12. Apply methods of modular construction														
13. Preparation of schedules for plans														
a. Calculating & sizing for schedules														
b. Prepare beam & column schedules														
c. Schedules for mechanical equipment														
d. Door & window schedules														
14. Familiarity with building trades														
a. Prepare details for cast stone, etc.														
b. Prepare details for masonry trades														
c. Prepare details for misc. metals														
d. Prepare details for carpentry														
15. Preparation of presentation drawings														
a. Use of non-perspective pictorials														
b. Application of perspective drawings														
1. Pseudo perspective layout														
2. One-point perspective layout														
3. Two-point perspective construction														
4. Drawing three-point perspectives														
c. Rendering skill of presentation dwgs.														
1. Pencil treatment of pictorials														
2. Pen & ink techniques														
3. Wash techniques														
4. Water color rendering of pictorials														
5. Tempera application to pictorials														
6. Ink & Zip-a-tone techniques														
7. Airbrush rendering of pictorials														
8. Applications of shades & shadows														

Drafting Technology Study

Civil Drafting Section
Respondent _____



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CIVIL DRAFTSMAN -- Drafts detailed construction drawings, topographical profiles, and related maps and specification sheets used in planning and construction of highways, river and harbor improvements, flood control, sewage and drainage systems, and other civil engineering projects.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Knowledge of elementary surveying														
2. Route planning & layout														
3. Use stereo-plotter														
4. Know & apply photogrammetry														
5. Legal principles & boundary control														
6. Use piping component symbols														
7. Use of structural properties for detailing														
8. Use of civil materials for detailing														
9. Graphical solution of statics problems														
10. Ability to detail structural steel members														
11. Sizing of structural components														
12. Detailing reinforced concrete design														
13. Ability to prepare project estimates														
14. Prepare critical path schedules														
15. Draw & arrange flow charts														
16. Ability to make earthwork computations														
17. Solve cut & fill problems														
18. Lay out planimetric details														
19. Preparation of plans for structures														
a. Representation of bridge construction														
b. Lay out highway plans & profiles														
c. Drafting of drainage structures														
d. Lay out platforms & industrial towers														
e. Prepare drawings for vessels														
f. Prepare drawings for power plants														
g. Detail yard piping & storage														
h. Lay out water & sewage systems														
20. Understanding of blueprint reading														
21. Knowledge of log drafting & symbols														
22. Ability to lay out plats & traverses														
23. Knowledge of basic architectural drawing														
24. Use of color separation for drawings														
25. Ability to write a technical report														

CIVIL DRAFTSMAN -- Continued

26. Solve development & intersection prob.
 a. Duct sizing
 b. Hoppers & conveyors

	0	1	2	3	4	5	6	7	8	9	10	less	same	more

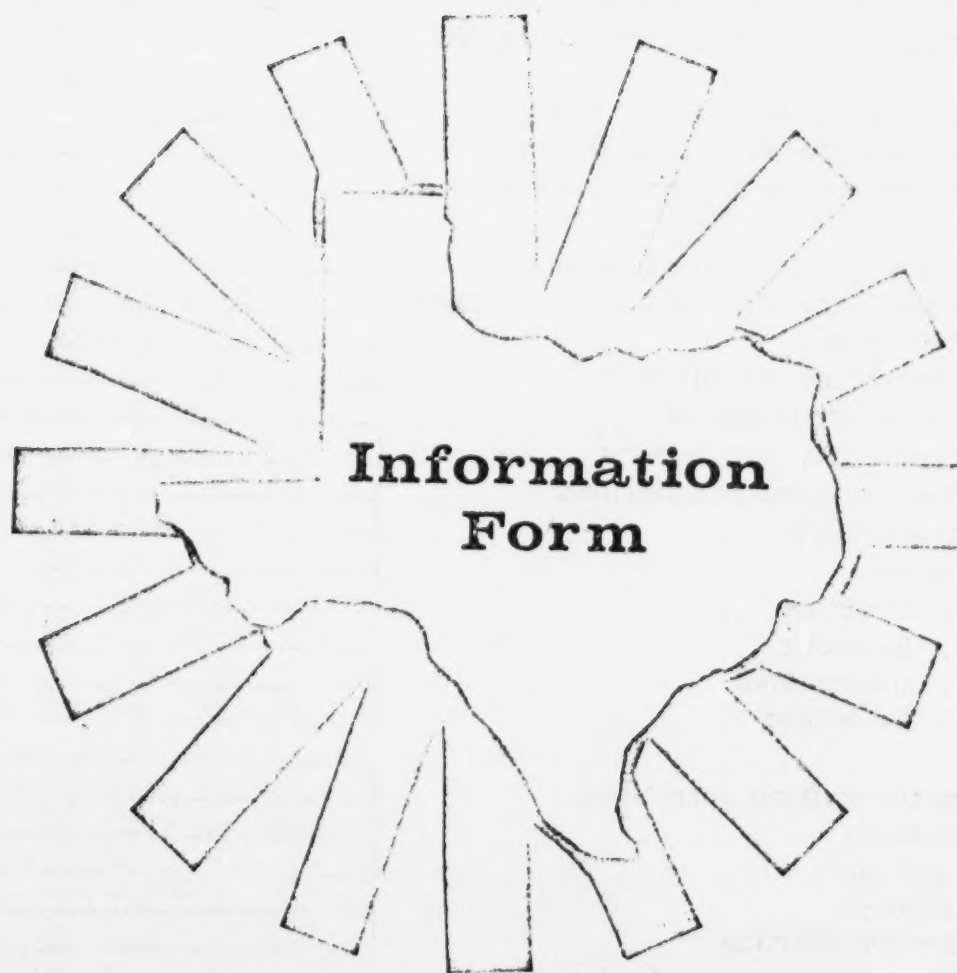
27. Detailing construction sites
 a. Residential site layout
 b. Industrial site layout
 c. Recreational site layout

NOTE: If relevant topics have not been provided, please specify and rate the additional items in the provided spaces. This space may also be used for your suggestions and comments.

Drafting Technology Study

Computer Drafting Section

Respondent _____



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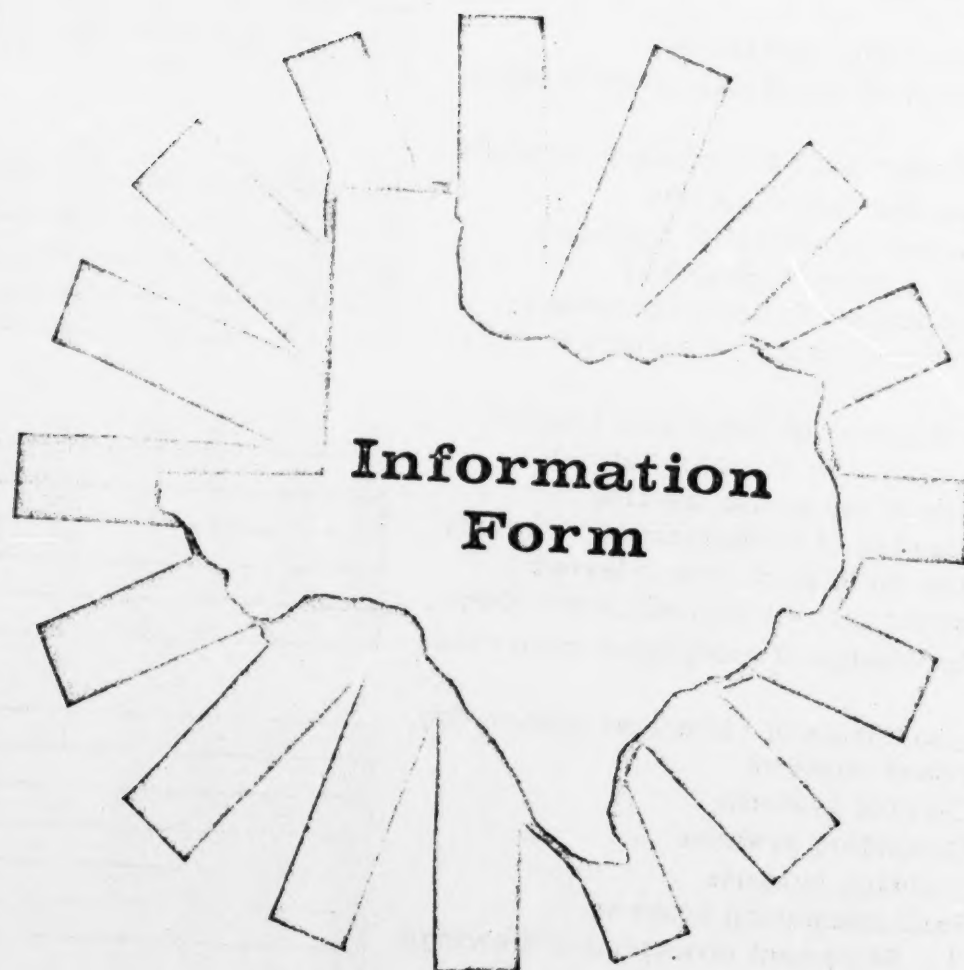
COMPUTER DRAFTSMAN -- Plans program to set up and direct the operations of numerically controlled drafting machines.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. General knowledge of drafting procedures														
2. Understanding of machine shop practices														
3. Working knowledge of FORTRAN														
4. Working knowledge of APT														
a. Binary control														
b. Cartesian coordinate system														
c. Principles of NC machine tools														
d. Processing, writing, debugging NC														
5. Use of cathode-ray tube & light pen														
6. Use of point-to-point programming														
7. Use of flexowriter for tape preparation														
8. Programming of digital computers														
a. Logical operation of digital computers														
b. Flow charts														
c. Sub-routine programming														
d. Library programming														
e. Fixed point calculations														
f. Floating point calculations														
g. Error analysis														
h. Coding														
1. Optimum														
2. Symbolic														
3. Interpretive														
4. Automatic														
9. Automatic drafting operations														
a. Scribing														
b. Plotting														
c. Lofting														
d. Straight drafting														
e. Computer-assisted designing														
10. Use of digitizing machines														
11. Digitizing from three-dimensional models														
12. Use of photogrammetric techniques														

Drafting Technology Study

Electrical, Electro-mechanical,
& Electronic Drafting Section

Respondent _____



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ELECTRICAL DRAFTSMAN

ELECTRONIC DRAFTSMAN

ELECTRO-MECHANICAL DRAFTSMAN

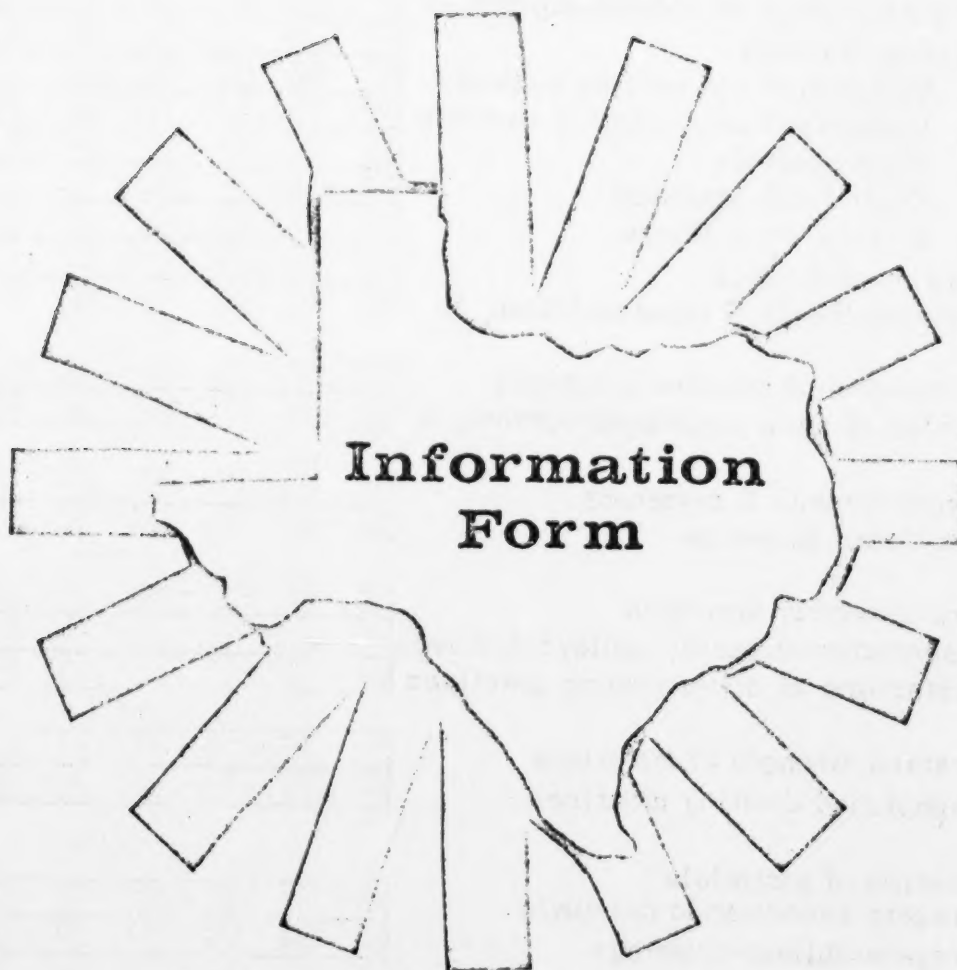
☐ Produces wiring and logic diagrams,
☐ schematics and layout drawings used in
☐ the manufacture, assembly, installation
 and repair of electrical and electronic equipment. Solves mechanical and fabri-
 cation problems through sketches and application of engineering theory.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Ability to work from sketches														
2. Understanding of dimensioning														
a. For numerical control														
b. Application of tolerances & fits														
c. Surface texture & finishes														
3. Use geometric tolerances														
4. Knowledge of electrical codes & stds.														
5. Use of electrical & electronic symbols														
a. Use one-line diagrams														
b. Preparation of block diagrams														
c. Use schematic diagrams														
d. Application to layout drawings														
e. Prepare pictorial diagrams & dwgs.														
6. Understanding of Electronic Theory														
a. Application of logic drawing														
b. Use of cryogenic drafting														
c. Drawing of microminiature circuits														
d. Use integrated circuit layout														
e. Preparation of printed circuit dwgs.														
f. Knowledge of production processes														
7. Representation of electrical system for:														
a. Power systems														
b. Control systems														
c. Grounding systems														
d. Lighting systems														
e. Instrumentation systems														
1. Equipment arrangement drawings														
2. Cabinet and panel design														
8. Knowledge of architectural drawing														
9. Know & apply structural drawing														
10. Ability to program for computer														
11. Requirements for microfilm reproduction														

Drafting Technology Study

Foundry Drafting Section

Respondent _____



1969 - 1970

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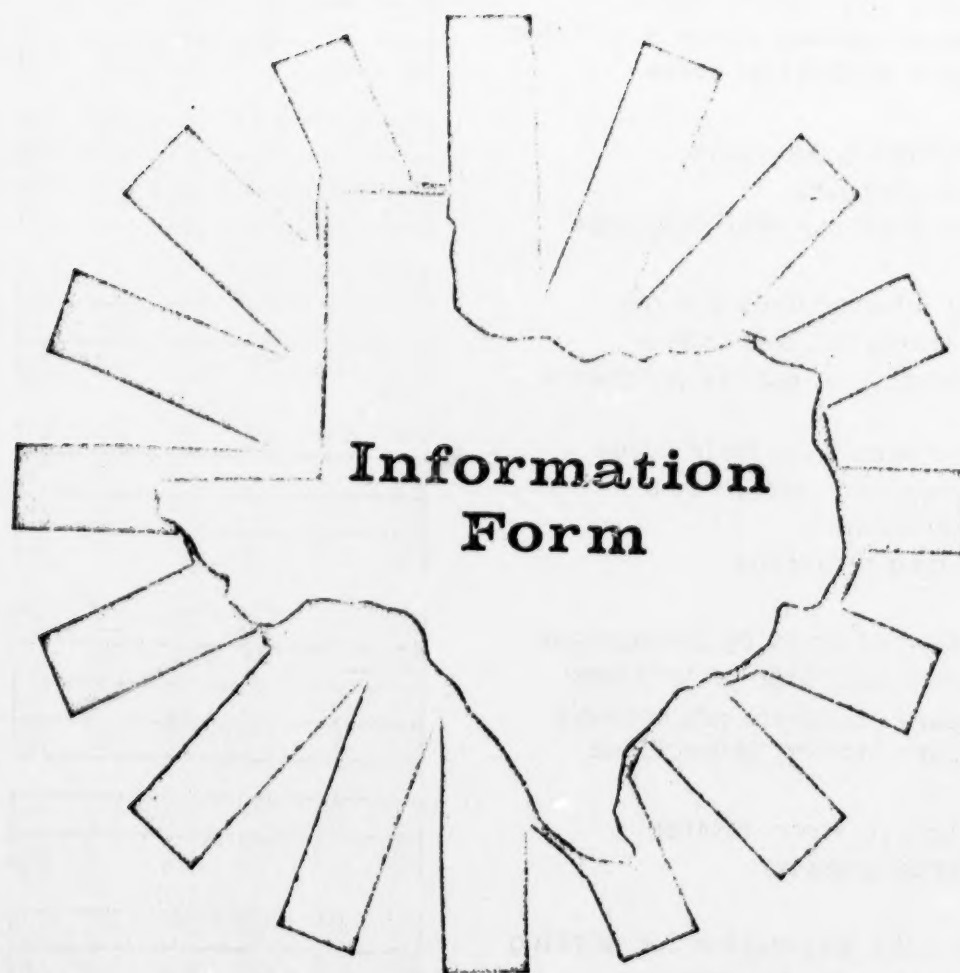
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FOUNDRY DRAFTSMAN -- Prepares drawings for castings which calls for special pattern making knowledge requiring attention to shrinking allowances and such factors as minimum radii of fillets and rounds.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Freehand drawing skill														
2. General knowledge of pattern making														
a. Draw & specify fillets & rounds														
b. Draw & specify runouts														
3. Working knowledge of forming processes														
a. Casting methods														
1. Understand die casting methods														
2. Understand sand casting methods														
3. Shell castings														
4. Centrifugal castings														
5. Investment castings														
b. Forging processes														
c. Welding theory & representation														
4. Understanding of machine practices														
5. Knowledge of shop processes/operations														
6. Represent threads & fasteners														
7. Prepare detail drawings														
8. Prepare assembly drawings														
9. Representation of gears, pulleys & drives														
10. Understanding of dimensioning practices														
11. Understand strength of materials														
12. Use simplified drafting practices														
13. Preparation of pictorials														
a. Prepare axonometric drawings														
b. Prepare oblique drawings														
c. Prepare perspectives														
14. Solve intersections & developments														
15. Construct charts, graphs & nomographs														
16. Drafting for microfilm reproduction														

Drafting Technology Study

Map Drafting Section
Respondent _____



1969 - 1970

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MAP DRAFTSMAN ☐
 MAPPER ☐
 TOPOGRAPHER ☐
 CARTOGRAPHER ☐
 PHOTOCARTOGRAPHER ☐

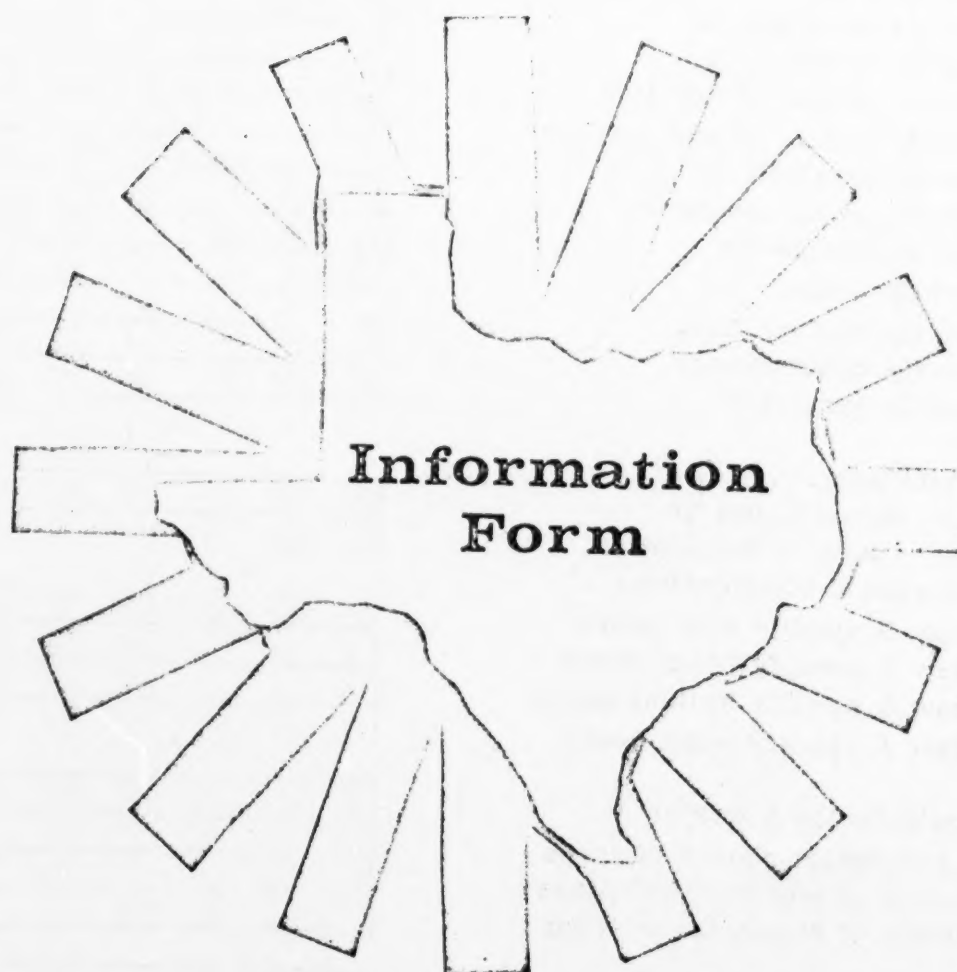
Delineates topographical drawings, identifies and locates roads, communities, structures, and installations. Analyzes survey data and legal records to determine location of natural or manmade features.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Preparation of maps & charts														
a. Prepare plats														
b. Prepare landscape maps														
c. Prepare cadastral maps														
d. Prepare topographic maps														
e. Prepare hydrographic maps														
f. Prepare engineering maps														
g. Prepare highway plans & profiles														
h. Prepare geological maps														
2. Draw profiles & sections														
3. Layout of contours														
4. Freehand lettering skill for maps														
5. Classify information for maps														
6. Lay out traverses & surveys														
7. Understanding of survey practices														
8. Ability to work from field notes														
9. Use of mapping instruments														
10. Use of symbols														
11. Prepare map revisions														
12. Preparation of maps by projections														
a. Prepare mercator projections														
b. Prepare gnomonic projections														
c. Prepare lambert projections														
13. Ability to use stereo-plotter														
14. Use photogrammetry														
15. Prepare color separation for printing														
16. Prepare diagrams & charts														
17. Use well logging symbols														
18. Prepare subsurface maps														
19. Prepare mine & quarry maps														
20. Detail site plans														

Drafting Technology Study

Mechanical & Tool Design Section

Respondent _____



1969 - 1970

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MECHANICAL DRAFTSMAN ☐ -- Produces detailed working drawings or schematics of machinery and mechanical devices.

TOOL DESIGN DRAFTSMAN ☐ -- Specializes in plans for tool manufacturing, usually follows indicated designs and specifications of tool designer.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Understanding of dimensioning														
a. Application of tolerances and fits														
b. Surface texture & finishes														
2. Use geometric tolerances														
a. Specify flatness														
b. Specify roundness														
c. Specify straightness														
d. Specify cylindricity														
e. Specify profile of any line														
f. Specify profile of any surface														
g. Specify parallelism														
h. Specify perpendicularity														
i. Specify angularity														
j. Specify runout														
k. Specify true position														
l. Specify concentricity														
m. Specify symmetry														
3. Solve intersection & development probs.														
a. Duct layout & design														
b. Duct sizing & calculating														
4. Gear design & computations														
a. Draw & specify spur gears														
b. Draw & specify bevel gears														
c. Draw & specify helical gears														
d. Draw & specify worm gears														
5. Cam calculation & design														
6. Draw and design jugs & fixtures														
7. Knowledge of architectural plans														
8. Knowledge of structural drawing														
9. Know electrical-electronics drafting														
10. Apply elementary electrical principles														
11. Prepare pipe drawings														
12. Use of welding symbols														
13. Use of simplified drafting practices														

MECHANICAL DRAFTSMAN

-- Continued

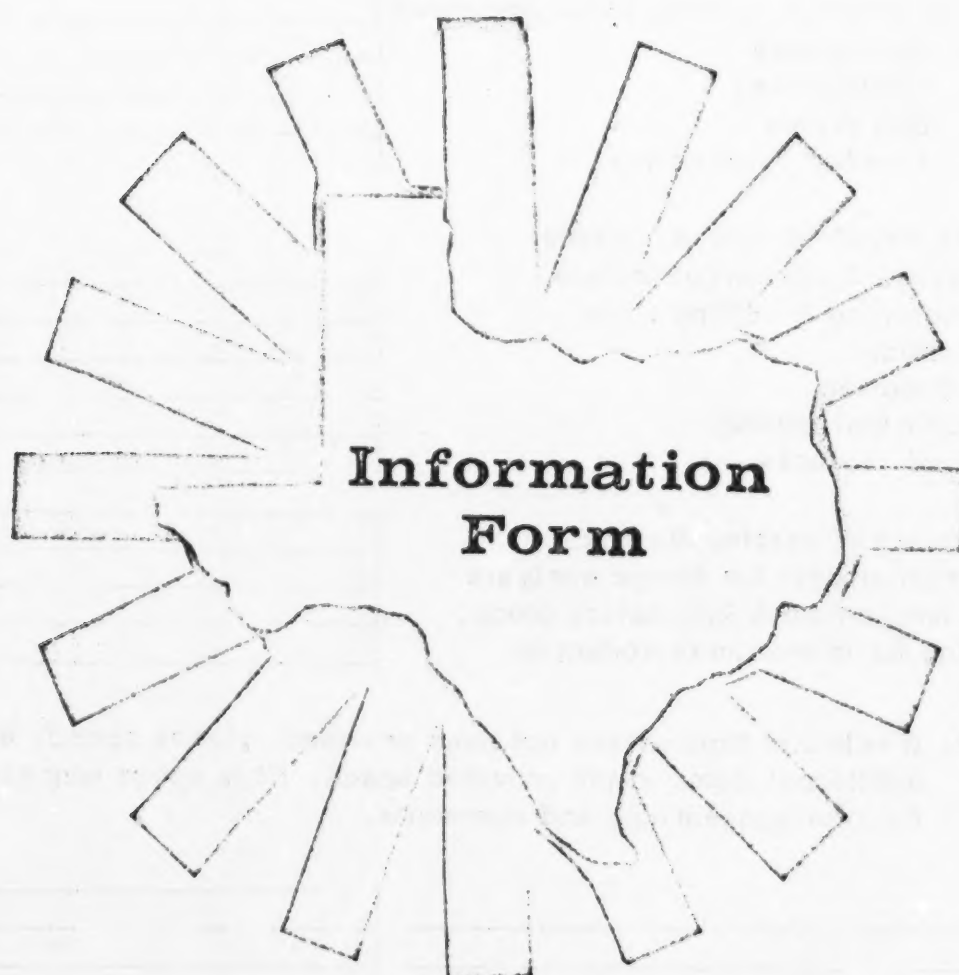
TOOL DESIGN DRAFTSMAN

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
14. Knowledge of tool inspection procedures														
15. Knowledge of cutting tool design														
16. Knowledge of punch & die design														
17. Knowledge of gage design fundamentals														
18. Knowledge of elements of machine design														
a. Use of power transmissions equipment														
1. Gear drives														
2. Chain drives														
3. Belt drives														
4. Flexible shaft drives														
19. Specify manufacturing processes:														
a. Ferrous & nonferrous metals														
b. Machining & cutting tools														
c. Plastics														
d. Automation														
e. Numerical control														
f. Wood products														
20. Preparation of casting drawings														
21. Construct models for design analysis														
22. Solve mechanism & kinematics probs.														
23. Drafting for microfilm reproduction														

NOTE: If relevant topics have not been provided, please specify and rate the additional items in the provided space. This space may also be used for your suggestions and comments.

Drafting Technology Study

Piping Drafting Section
Respondent _____



1969 - 1970

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PIPING DRAFTSMAN -- Makes drawings for layout, construction, and operation of oil fields, refineries and pipeline systems from field notes and rough or detailed sketches and specifications.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Use of piping specifications & materials														
2. Use of piping components & symbols														
a. Prepare single-line pipe drawings														
b. Prepare double-line pipe drawings														
3. Understanding of orthographic projection														
4. Use of simplified drafting practices														
5. Apply dimensioning practices														
6. Understanding of basic electrical design														
7. Understanding of basic instrumentation														
a. Detail instrument & control lines														
b. Detail control airline drawings														
c. Detail float control & alarm drawings														
8. Prepare architectural plans														
a. Detail plot plans														
b. Detail elevations														
9. Specify structural components														
a. Prepare structural steel specifications														
b. Prepare rebar specifications														
c. Specification of prestressed concrete														
d. Specify wood/timber construction														
10. Ability for basic structural detailing														
a. Prepare structural steel details														
b. Prepare reinforced concrete details														
c. Prepare prestressed concrete details														
d. Prepare wood/timber const. details														
11. Use Smoley's Trig. Handbook														
12. Lay out equipment arrangements for:														
a. Power plants														
b. Chemical plants														
c. Industrial plants														
d. High or low pressure systems														
e. Conveyor systems														

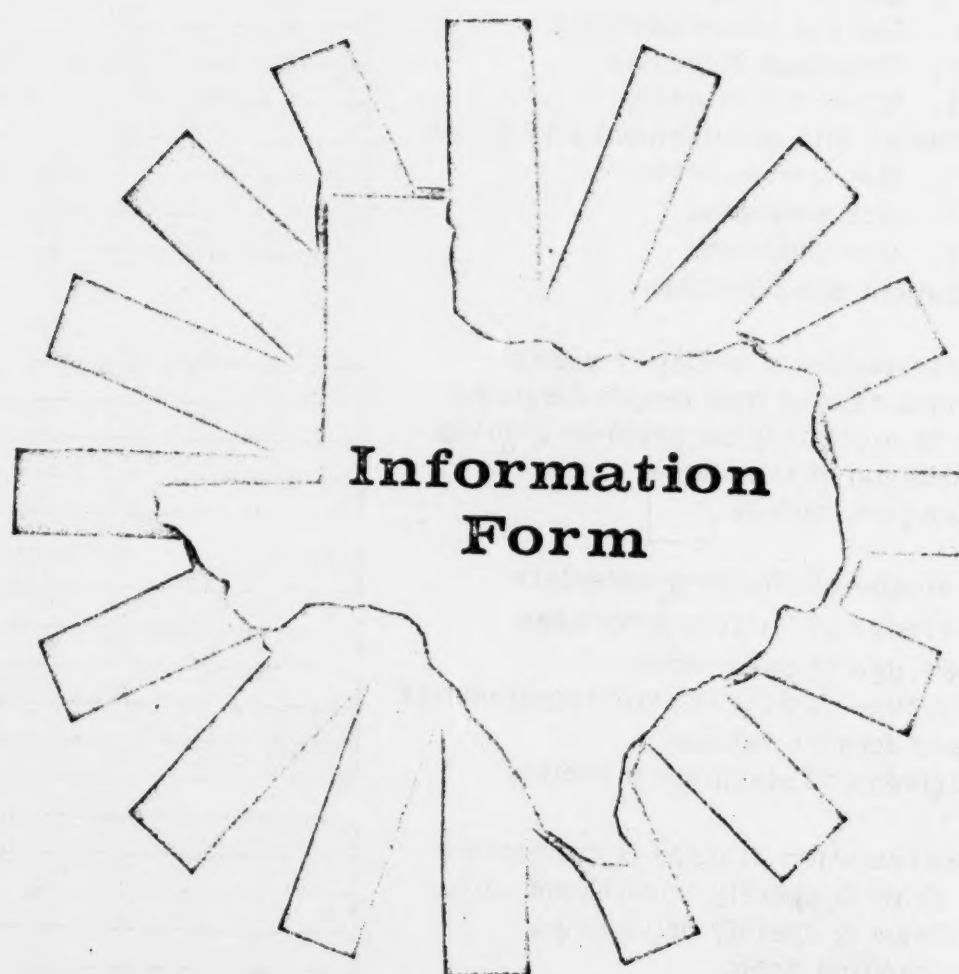
PIPING DRAFTSMAN -- Continued

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
13. Knowledge of mechanical equipment														
14. Calculate & lay out pipe grades														
15. Representation of vessels														
a. Prepare dwgs. for heat exchangers														
b. Prepare drawings for towers														
c. Prepare drawings for drums														
d. Prepare drawings for tanks														
e. Prepare drawings for furnaces														
f. Prepare dwgs. for pressure vessels														
16. Construct models														
a. For design analysis														
b. For arrangement analysis														
c. For sales presentation														
17. Preparation of drawings														
a. Prepare dimetric pictorials														
b. Prepare isometric pictorials														
c. Prepare perspective drawings														
d. Prepare developed pipe drawings														
e. Prepare industrial layouts														
18. Drafting of civil structures														
a. Railroad layouts for industrial sites														
b. Excavation detailing														
c. Prepare drawings for dams & dykes														
19. Preparation of nomographs														
a. Use of critical path scheduling														
b. Lay out flow diagrams														
c. Prepare charts and graphs														
20. Prepare cost & quantity estimates														
21. Drafting for microfilm reproduction														
22. Program for computer														

Drafting Technology Study

Sheet Metal Drafting Section

Respondent _____



1969 - 1970

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SHEET METAL DRAFTSMAN -- Prepares scale layouts of sheet metal parts for installation of conveyor systems, air conditioning, heating, or ventilating equipment. Often required to mathematically establish the heat loss or gain, and volume capacities for conveyor or duct systems to determine equipment specifications for structures.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Knowledge of general drafting methods														
2. Ability to make freehand drawings														
3. Solve developments & intersections														
a. Lay out by shortcut methods														
b. Parallel line development and layout														
1. Lay out tee patterns														
2. Lay out elbow patterns														
3. Construct branches														
4. Miter construction														
c. Radial line development and layout														
1. Use triangulation														
2. Use sweeping														
3. Use rollation														
d. Layout combinations														
4. Constructions of auxiliary views														
5. Construction of true length diagrams														
6. Use of revolution for problem solving														
7. Utilization of templates														
8. Dimension layouts														
9. Knowledge of sheeting materials														
10. Knowledge of forming processes														
11. Knowledge of bend radii														
12. Knowledge of edge-margin requirements														
13. Use of forming tables														
14. Knowledge of stamping & tooling														
15. Representation of clips & connectors														
a. Draw & specify government clips														
b. Draw & specify drive clips														
c. Standing seam														
16. Representation of seams and locks														
a. Draw & specify riveted joints														
b. Draw & specify notched joints														
c. Draw & specify solder joints														
d. Draw & specify welded joints														

18. Prepare designs for louver construction

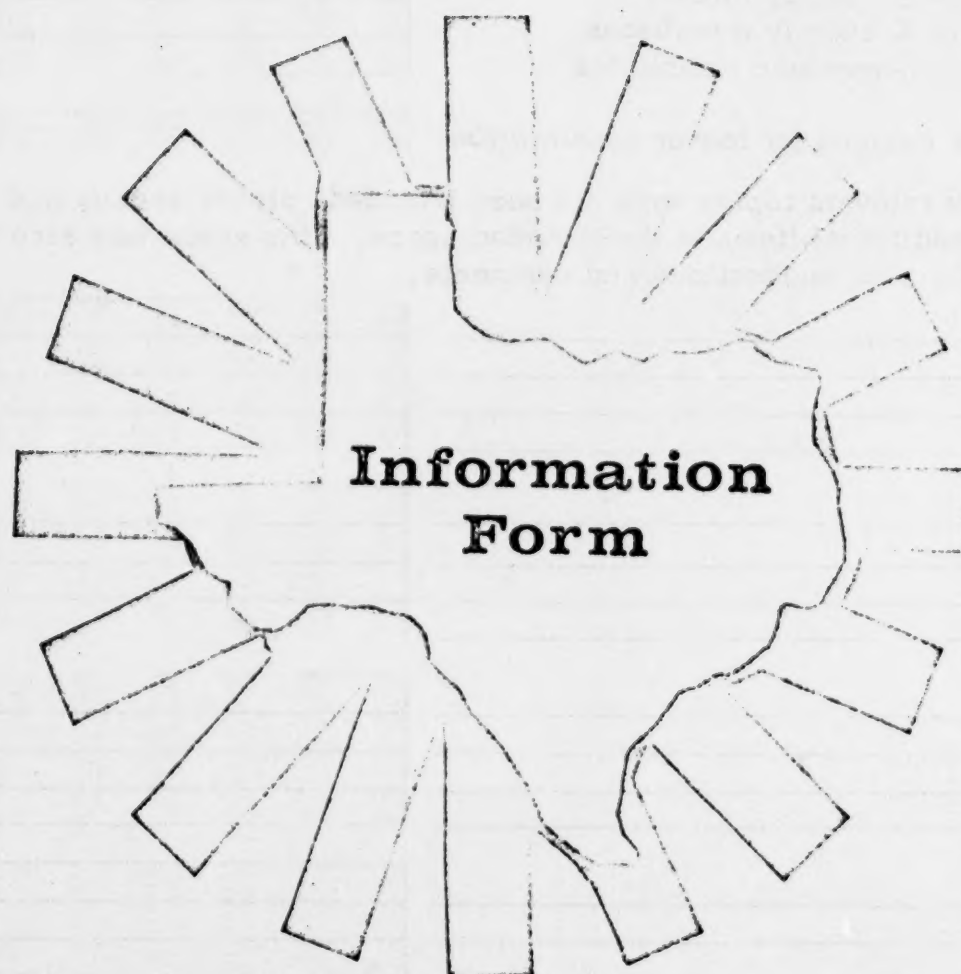
A bar graph showing the number of students in each grade from 0 to 10. The x-axis is labeled 0 through 10. The y-axis has labels 'less', 'same', and 'more'. The bars show a steady increase in height from grade 0 to grade 10.

NOTE: If relevant topics have not been provided, please specify and rate the additional items in the provided space. This space may also be used for your suggestions and comments.

Drafting Technology Study

Structural Drafting Section

Respondent _____



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STRUCTURAL DRAFTSMAN -- Prepares engineering design and shop drawings for structures employing structural steel, reinforced or prestressed concrete, or timber members.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Knowledge of structural steel members														
a. Bill of material preparation														
b. Take-off procedures														
c. Calculate weight of materials														
d. Prepare cost & quantity estimates														
2. Design of structural components														
a. Structural steel														
b. Reinforced concrete														
c. Prestressed concrete														
d. Wood/timber construction														
3. Prepare structural details														
a. Structural steel														
b. Reinforced concrete														
c. Prestressed concrete														
d. Wood/timber construction														
4. Knowledge of shop fabrication methods														
5. Representation of structural fasteners														
a. Symbolic representation of rivets														
b. Symbolic representation of bolts														
c. Use welding symbols														
6. Use of stds. & recommended practices														
a. Use AISC Standards														
b. Use CRSI Standards														
c. Use Smoley's Tables														
d. Use AWS (welding) Standards														
7. Use simplified drafting practices														
8. Application of color coding on dwgs.														
9. Truss detailing														
10. Draw shear & moment diagrams														
11. Sizing of beam connections														
a. Specify & detail seated connections														
b. Specify & detail framed connections														
c. Specify & detail skewed connections														
d. Specify & detail special connections														

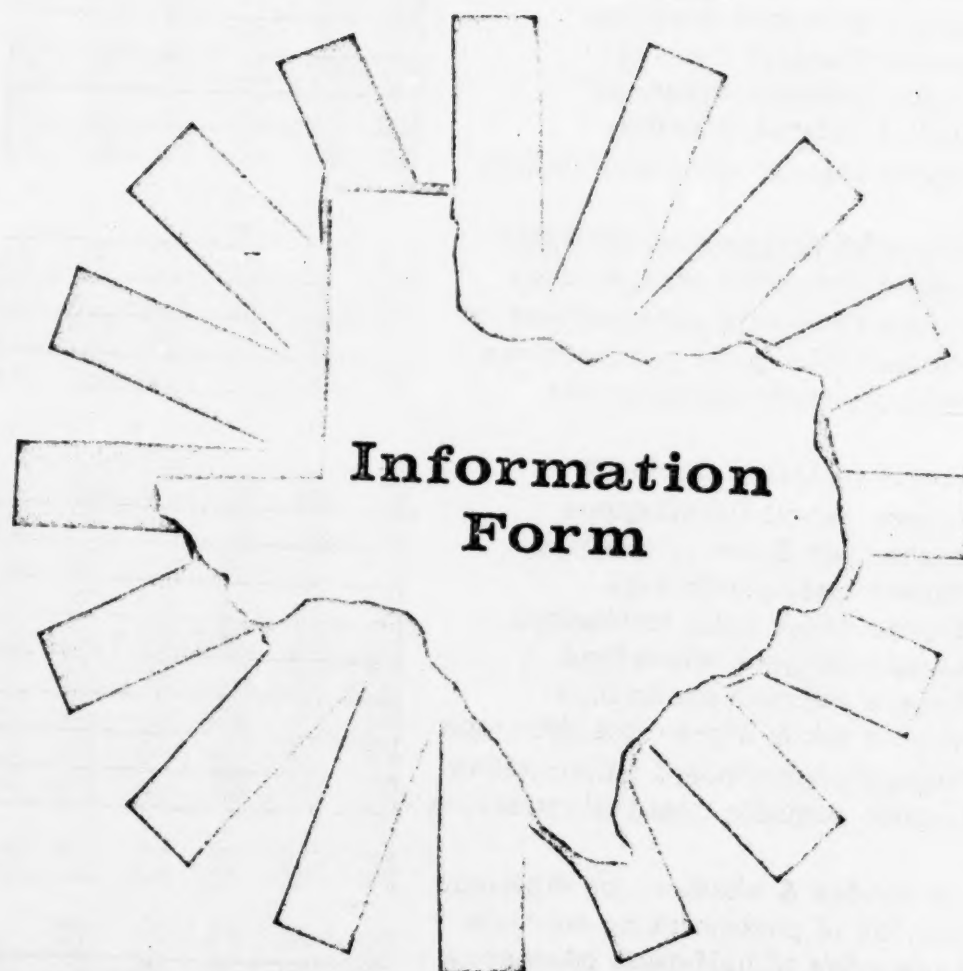
STRUCTURAL DRAFTSMAN -- Continued

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
12. Use machine finish symbols														
13. Calculate & specify tolerances														
14. Solve mechanism & kinematics problems														
15. Use architectural standards & symbols														
16. Know piping components & symbols														
17. Solve intersection problems														
18. Solve development problems														
19. Nomograph construction & application														
a. Prepare schedules														
b. Use of calculations & charts														
20. Program for computer														
21. Requirements for microfilm reproduction														
22. Specify & detail anchor bolt plans														
23. Specify foundation details														

NOTE: If relevant topics have not been provided, please specify and rate the additional items in the provided space. This space may also be used for your suggestions and comments.

Drafting Technology Study

Technical Illustration Section
Respondent _____



1969 - 1970

IN COOPERATION WITH: TEXAS EDUCATION AGENCY
• TEXAS ENGINEERING EXPERIMENT STATION • DEPARTMENT OF ENGINEERING GRAPHICS, TEXAS A&M UNIVERSITY

TECHNICAL ILLUSTRATORS -- Specializes in illustrations for reproduction in reference works, brochures, and technical manuals dealing with the assembly, installation, operation, maintenance, and repair of machines, tools, and equipment.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Ability to write a technical report														
2. Ability to illustrate technical reports														
3. Understanding of multiview projection														
a. Freehand technical sketching skill														
4. Preparation of drawings														
a. Prepare isometric drawings														
b. Prepare dimetric drawings														
c. Prepare trimetric drawings														
d. Parallel oblique drawings														
e. Prepare angular oblique drawings														
5. Preparation of perspective drawings														
a. Prepare one-point perspectives														
b. Prepare two-point perspectives														
c. Prepare three-point perspectives														
d. Prepare pseudo perspectives														
6. Prepare presentation drawings														
a. Prepare pencil illustrations														
b. Prepare pen & ink renderings														
c. Prepare wash renderings														
d. Prepare water color renderings														
e. Prepare tempera renderings														
f. Prepare airbrush renderings														
g. Prepare ink & Zip-a-tone drawings														
h. Prepare scratchboard illustrations														
i. Prepare coquille board illustrations														
7. Use of shades & shadows on drawings														
8. Application of photoprinting methods														
a. Knowledge of half-tone processes														
b. Use color separation processes														
c. Use photo retouching														
d. Preparation of work for printing														
9. Application of silkscreening														
10. Use doubitone (Craftint)														

TECHNICAL ILLUSTRATORS -- Continued

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
11. Advertising layout & design ability														
12. Brochure design ability														
13. Use of time saving devices														
a. Lettering aids														
b. Templates														
c. Appliques (transfer films, etc.)														
14. Knowledge of machine design														
15. Knowledge of mechanisms & kinematics														
16. Knowledge of art & design principles														
17. Preparation of visual aids														
a. Prepare transparencies & overlays														
b. Prepare flip charts														
c. Prepare photographic slides														
d. Prepare display models														
e. Prepare schematics & diagrams														

NOTE: If relevant topics have not been provided, please specify and rate the additional items in the provided space. This space may also be used for your suggestions and comments.

12	TECHNICAL ILLUSTRATION
11	STRUCTURAL
10	SHEET METAL
9	PIPING
8	MECHANICAL & TOOL DESIGN
7	MAP
6	FOUNDRY
5	ELECTRICAL, ELECTRONIC, & ELECTRO-MECHANICAL
4	COMPUTER
3	CIVIL
2	ARCHITECTURAL
1	AERONAUTICAL

	1	2	3	4	5	6	7	8	9	10	11	12
1. Use of scales	9.25	3.37	4.76	7.58	5.99	4.00	5.67	6.81	4.10	5.79	3.87	5.07
a. Decimal	6.86	8.29	9.68	5.44	7.41	9.14	9.79	6.87	7.70	5.26	7.82	6.45
b. Engineers	2.25	9.93	7.82	4.30	6.90	5.75	5.73	5.62	8.56	7.21	9.27	5.34
c. Architectural	3.25	1.31	1.26	1.80	1.79	0.63	1.98	1.88	2.15	1.93	1.69	1.59
d. Metric	10.00	9.52	9.60	8.64	9.44	8.87	9.52	9.65	9.60	9.58	9.34	9.41
2. Use of drafting instruments	6.87	8.26	7.91	8.75	7.73	6.50	8.07	7.94	8.02	8.44	7.93	7.61
3. Application of line conventions	9.50	9.03	8.69	9.83	8.68	7.87	9.16	8.70	8.95	9.03	8.77	8.48
a. Speed of execution	7.62	9.02	8.44	8.00	8.46	8.00	7.78	8.45	8.82	9.21	8.52	7.36
b. Skill of application	3.17	4.93	5.95	3.90	4.36	1.25	7.90	3.48	2.98	2.49	3.33	7.16
c. Skill in use of pencil	7.75	6.85	7.14	7.36	7.07	5.50	7.22	7.03	7.39	7.09	7.12	6.90
d. Inking skill	5.43	5.31	6.45	6.08	5.45	3.50	7.59	4.59	4.43	3.63	4.28	7.61
4. Use of std. abbreviations	7.87	8.25	8.03	8.08	7.52	7.00	7.64	7.66	8.20	8.19	8.34	7.36
5. Ability to letter	7.25	7.94	7.38	6.42	6.88	5.37	7.55	7.06	6.67	7.14	7.20	7.70
a. Use mechanical devices	7.12	6.73	5.76	6.75	6.16	6.25	4.31	6.12	6.79	7.42	6.31	7.09
b. Speed in lettering	9.00	6.80	6.76	8.73	7.66	7.62	4.41	8.75	8.42	8.72	7.71	7.60
c. Perfection in lettering	7.37	7.69	7.64	8.82	8.15	7.87	7.05	7.68	7.68	8.11	7.49	8.19
6. Ability to make freehand sketches	7.50	5.06	6.14	5.64	4.85	3.62	5.52	5.56	5.31	5.37	6.09	5.86
7. Understanding of multiview proj.	5.14	3.00	4.52	4.64	3.90	3.50	4.21	4.31	3.69	3.87	4.12	3.87
8. Apply simplified drawing practices	4.50	8.66	6.76	4.25	6.71	8.12	4.56	7.61	9.00	7.29	9.15	5.43
9. Use geometric construction	9.00	4.25	7.59	7.67	6.56	7.87	6.73	7.84	6.02	6.35	5.47	5.91
a. Use of graph. math & vectors	8.87	4.01	3.62	6.00	4.88	9.87	2.25	7.73	4.79	6.28	4.52	3.82
10. Dimensioning practices	7.75	4.38	5.68	6.10	4.85	7.75	4.51	6.21	6.08	5.59	5.29	4.39
a. Use of fractional dimensioning	6.87	5.98	4.36	5.82	4.04	7.14	2.28	6.31	3.22	5.85	4.12	3.23
b. Application of decimal methods												
c. Specify tolerances & fits												
d. Treatment of true positioning												
e. Specify surface texture/finishes												

	1	2	3	4	5	6	7	8	9	10	11	12
f. Dim. for numerical control	5.25	5.96	5.94	6.58	3.84	4.75	5.14	4.66	4.34	5.03	5.30	3.00
11. Knowledge of shop processes												
a. Machine shop operations	7.25	2.28	2.39	5.64	4.42	7.87	0.91	7.11	4.45	6.24	4.25	3.07
b. Forge shop operations	4.14	1.55	1.20	2.90	1.73	4.71	0.65	3.22	2.34	2.45	2.29	1.07
c. Pipe shop operations	3.71	2.35	3.19	3.60	2.45	5.17	1.56	3.80	7.59	3.58	4.20	1.45
d. Weld shop operations	5.62	3.70	3.99	5.80	5.11	4.75	1.40	6.56	6.85	8.31	7.30	2.71
e. Electric shop operations	4.00	2.51	2.19	4.60	5.60	6.14	1.18	3.73	3.16	4.84	2.74	2.79
12. Recognition of reproduction media												
a. Bluepring - white line	4.75	5.93	5.46	3.00	4.74	1.00	4.82	4.55	5.20	3.94	5.37	4.20
b. Sepias - brown line	6.00	7.52	7.18	6.50	7.06	5.50	7.68	7.07	7.05	6.69	7.43	6.43
c. Diazo - blue line	7.29	7.89	8.45	6.55	7.55	8.37	8.91	7.64	7.80	7.92	8.12	7.70
d. Xerography - black line	6.87	5.88	6.14	6.09	6.32	4.37	6.15	5.28	6.40	4.94	5.31	6.95
e. Offset printing	3.75	3.78	4.05	5.30	3.99	0.43	5.13	3.44	4.27	3.20	3.06	7.36
f. Van Dyke prints	4.40	3.14	2.88	3.60	2.32	0.29	3.85	2.41	2.60	2.68	2.55	2.83
g. Microfilm	5.50	4.01	4.37	7.18	4.29	4.57	4.58	4.46	4.33	5.03	3.60	5.07
13. Short cut dftg. methods												
a. Use tracing grads	5.57	6.35	6.95	7.50	7.19	4.50	6.61	6.35	6.71	6.67	6.59	7.36
b. Use drawing templates	8.00	7.72	7.76	8.08	8.62	7.12	7.65	8.05	8.39	7.94	8.15	8.74
14. Sections and conventions	8.87	9.10	8.17	8.18	8.10	9.50	6.66	8.97	8.96	8.89	9.39	7.14
15. Use & treatment of auxiliary views	8.37	7.06	6.30	7.82	6.84	7.37	4.55	8.11	7.82	8.23	7.45	6.81
16. Use revolution for problem solving												
a. Determination of true length	8.12	4.68	5.25	6.30	4.29	3.87	3.77	5.29	5.61	6.12	5.86	3.90
b. True size of inclined surfaces	7.37	5.22	5.10	7.40	4.22	2.87	3.21	5.29	4.94	6.41	5.67	4.22
c. Clarification of drawings	8.37	6.75	6.36	8.30	6.34	6.12	4.84	6.55	7.09	7.12	7.08	5.93
17. Solve developments/intersections	7.50	4.95	5.51	6.50	4.12	4.87	4.60	5.59	5.58	6.88	5.53	3.27
18. Threads & fasteners												
a. Use detailed representation	2.71	2.07	2.37	1.20	2.00	3.12	1.15	3.69	3.04	2.35	3.00	4.23
b. Use schematic representation	6.43	3.89	4.39	3.50	5.00	7.37	1.66	6.23	5.75	4.35	5.02	5.86
c. Use simplified representation	7.62	4.52	5.25	8.60	5.78	8.25	2.26	7.61	6.91	7.63	6.78	6.12

	1	2	3	4	5	6	7	8	9	10	11	12
d. Application of welding symbols	7.37	4.17	5.35	6.70	4.72	5.87	2.12	6.80	6.23	7.28	8.36	3.40
e. Application of riveting symbols	7.37	2.25	2.28	3.20	2.00	1.75	0.97	2.56	1.70	4.55	3.35	1.87
19. Lay out working drawings	8.62	9.27	8.63	8.58	8.16	8.87	6.94	8.60	8.96	9.34	9.15	6.09
20. Preparation of assembly drawings	9.00	5.39	5.32	8.64	6.95	8.25	3.48	8.38	8.02	8.80	7.28	6.19
21. Ability to make drawing revisions	8.87	8.84	8.74	8.08	8.95	8.87	7.82	8.80	9.19	9.03	9.27	7.55
22. Use models & model construction												
a. For design analysis	4.29	4.98	2.82	3.45	2.59	2.50	1.67	3.70	3.67	4.67	3.21	2.53
b. For sales presentation	3.17	5.12	2.14	3.00	2.13	1.37	1.31	2.64	2.20	3.74	2.59	3.67
23. Ability to make pictorial drawings												
a. Prepare exploded pictorials	5.00	3.46	2.89	5.09	3.69	4.87	2.42	4.51	3.46	4.58	3.38	6.95
b. Prepare isometric pictorials	4.37	4.75	4.22	6.73	5.07	4.00	2.98	4.88	6.65	5.97	4.69	7.21
c. Prepare dimetric pictorials	3.00	2.16	1.88	1.50	2.22	2.00	1.12	2.41	2.37	5.10	2.42	3.93
d. Prepare trimetric pictorials	2.20	1.93	1.70	1.70	1.76	1.87	0.95	1.97	1.89	2.73	2.03	3.62
e. Prepare oblique pictorials	3.00	2.56	2.21	1.80	2.56	2.37	1.50	2.52	2.25	3.52	2.35	4.33
f. Prepare perspective pictorials	4.50	6.41	3.03	3.27	3.11	2.50	2.28	2.92	3.16	3.30	3.45	6.21
g. Prepare renderings	2.40	5.84	1.97	2.43	1.86	2.43	2.09	1.87	2.04	2.50	2.21	5.52
24. Application of design processes												
a. For individual project	6.86	6.74	5.39	6.60	6.13	7.62	3.96	6.44	6.94	7.63	6.13	4.70
b. For systems or group projects	5.67	5.89	4.65	6.89	5.55	6.12	2.76	5.71	5.94	6.81	5.31	4.72
25. Charts, graphs, nomographs	5.62	4.08	5.45	5.09	4.57	4.00	5.27	4.13	4.61	3.32	4.16	7.51
26. Flow & critical path diagrams	4.00	3.34	4.29	6.09	4.15	4.62	3.82	4.36	5.66	4.56	3.30	4.91
27. Calculate/specify cams & gears	4.43	0.49	0.91	2.82	1.85	4.87	0.23	3.64	1.33	2.48	1.19	1.61
28. Descript. geometry prob. solving												
a. Piercing points of lines/planes	6.75	2.74	4.06	5.62	2.78	2.29	3.02	3.80	3.67	4.77	4.05	3.50
b. Dihedral angles	6.50	1.76	2.97	3.86	2.39	2.86	1.57	3.22	2.59	3.52	3.23	2.17
c. Perpendicularity of lines/planes	6.75	2.99	4.32	6.25	3.08	3.00	3.15	4.36	3.72	4.71	4.38	3.53

	1	2	3	4	5	6	7	8	9	10	11	12
1. Use AISC Manual	2.33	6.56	6.11	5.17	2.85	3.00	3.00	3.90	5.26	4.88	8.88	1.44
2. Use CRSI Manual	4.00	5.73	5.18	3.60	1.96	2.00	2.10	2.21	3.08	1.77	7.64	0.81
3. Use Smoley's Combined Tables	2.33	4.23	4.81	3.75	2.88	2.60	2.29	3.39	6.29	3.92	7.39	1.76
4. Use ASA Standards	5.00	3.96	4.26	6.14	5.75	5.86	1.85	6.34	6.75	5.37	4.98	3.49
a. USASI-Y 14.5 Dim. & Tol.	4.50	1.52	1.98	5.40	3.86	4.50	0.47	4.78	3.47	3.18	2.59	2.26
5. Use SAE Standards	5.29	2.30	2.84	4.12	4.02	7.14	1.21	5.38	4.08	4.14	3.30	3.53
6. Use "Company Standards"	8.25	7.15	7.72	8.64	7.96	7.62	8.45	7.93	8.13	8.71	8.15	7.19
7. Use Sweet's Catalogs	4.00	8.55	4.62	4.33	3.94	2.17	2.44	3.81	3.90	3.93	5.75	2.11
8. Use Machinery Handbooks	6.62	2.54	3.66	6.30	5.96	7.37	2.24	7.65	6.15	6.94	4.64	3.53
9. Use Military Standards	7.29	2.49	2.05	5.17	3.57	2.20	1.67	3.18	2.13	4.05	2.90	3.80

TECHNICAL ILLUSTRATION

STRUCTURAL

SHEET METAL

PIPING

MECHANICAL & TOOL DESIGN

MAP

FOUNDRY

ELECTRICAL, ELECTRONIC, &
ELECTRO-MECHANICAL

COMPUTER

CIVIL

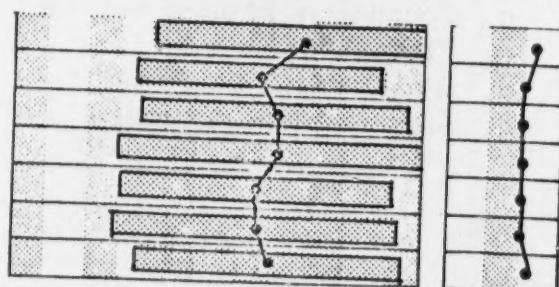
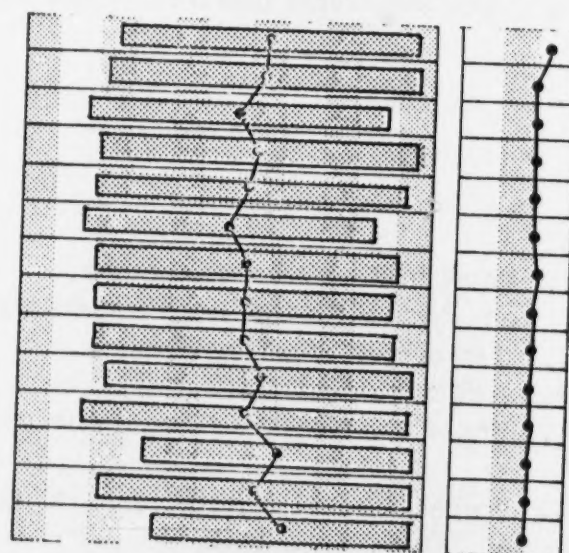
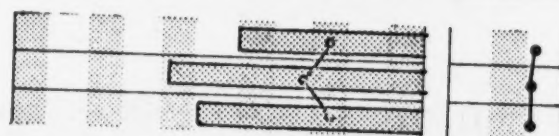
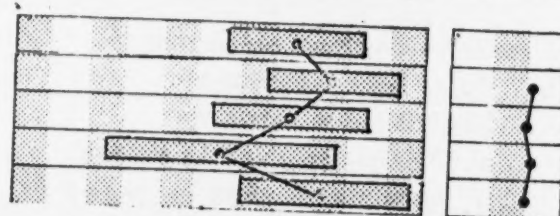
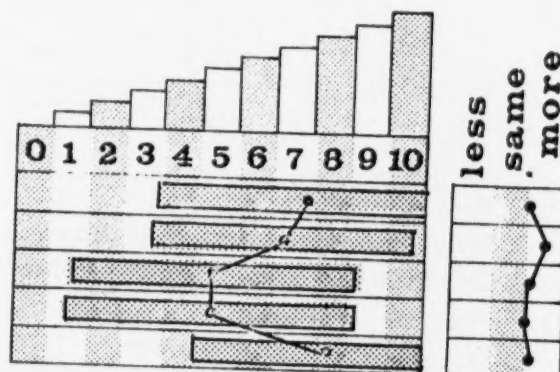
ARCHITECTURAL

AERONAUTICAL

1. Use AISC Manual
2. Use CRSI Manual
3. Use Smoley's Combined Tables
4. Use ASA Standards
 - a. USASI-Y 14.5 Dim. & Tol.
5. Use SAE Standards
6. Use "Company Standards"
7. Use Sweet's Catalogs
8. Use Machinery Handbooks
9. Use Military Standards

AERONAUTICAL DRAFTSMAN -- Specializes in engineering drawings of developmental or production aircraft, missiles, and ancillary equipment including launch mechanisms and scale models of prototype aircraft, as planned by aeronautical engineers.

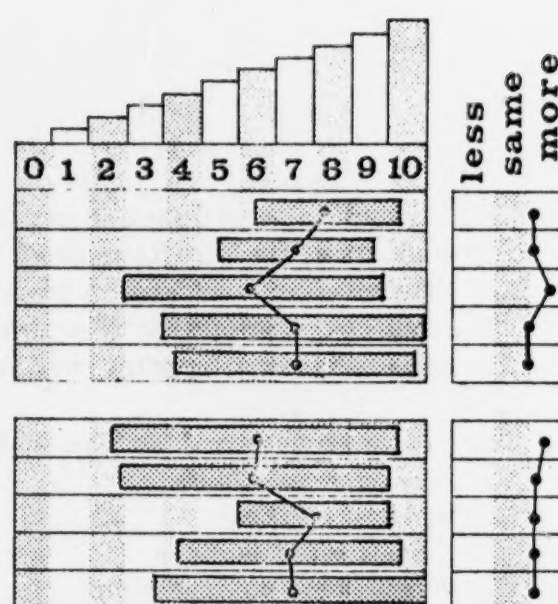
1. Understanding of orthographic projection
 - a. Use simplified drafting practices
 - b. Orthographic conversion to isometric
 - c. Isometric conversion to orthographic
 - d. Knowledge of blueprint reading
2. Prepare engineering drawings from:
 - a. Freehand sketches
 - b. Scale drawings
 - c. Constructed models
 - d. Verbal/oral instructions
3. Solve trigonometry problems
4. Solve mechanism & kinematics problems
5. Understanding of dimensioning theory
6. Use geometric tolerances
 - a. Specify flatness
 - b. Specify straightness
 - c. Specify roundness
 - d. Specify cylindricity
 - e. Specify profile of any line
 - f. Specify profile of any surface
 - g. Specify parallelism
 - h. Specify perpendicularity
 - i. Specify angularity
 - j. Specify runout
 - k. Specify true position
 - l. Specify concentricity
 - m. Specify symmetry
7. Understanding of shop practices
 - a. Specify heat treatment
 - b. Specify drilling operations
 - c. Representation of fasteners
 1. Bolts
 2. Rivets
8. Use welding theory & symbology



AERONAUTICAL DRAFTSMAN -- Continued

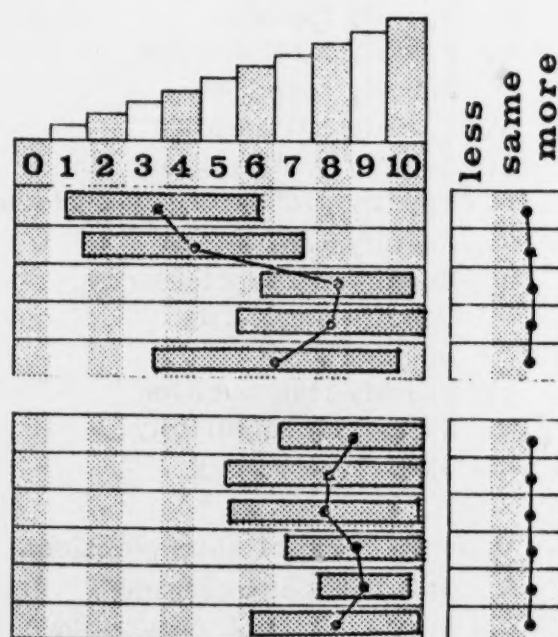
9. Use datum planes
10. Prepare instrumentation drawings
11. Drafting for microfilm reproduction
12. Prepare sections & conventions
13. Prepare auxiliary views.

14. Use descriptive geometry
15. Solve intersections
16. Layout developments
 - a. Single-curved surfaces
 - b. Double-curved surfaces

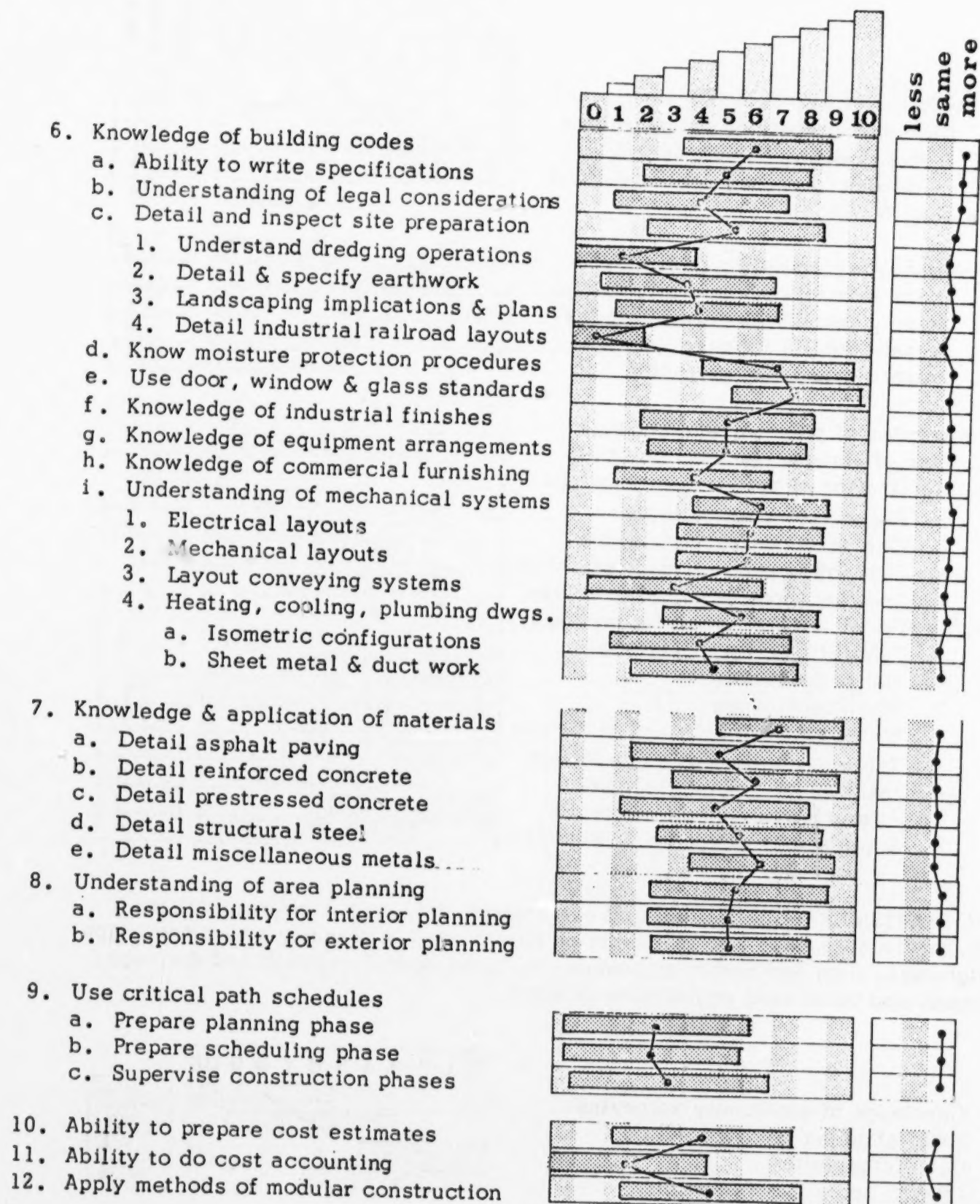


ARCHITECTURAL DRAFTSMAN -- Specializes in the delineation of the architectural and structural features of any class of building and like structures.

1. Know history of architecture
 - a. Recognition of architectural styles
2. Use architectural symbols
3. Architectural lettering skill
4. Understanding of orthographic projection
5. Preparation of architectural details
 - a. Site plan details
 - b. Foundation plans & details
 - c. Floor plans
 - d. Elevations & sections
 - e. Framing plans & details



ARCHITECTURAL DRAFTSMAN -- Specializes in the delineation of the architectural and structural features of any class of building and like structures.

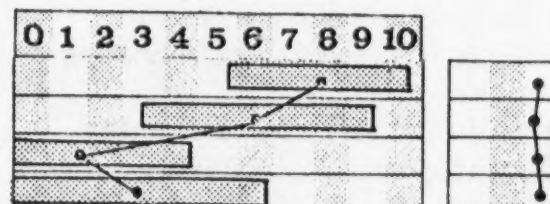


ARCHITECTURAL DRAFTSMAN -- Continued

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
13. Preparation of schedules for plans														
a. Calculating & sizing for schedules														
b. Prepare beam & column schedules														
c. Schedules for mechanical equipment														
d. Door & window schedules														
14. Familiarity with building trades														
a. Prepare details for cast stone, etc.														
b. Prepare details for masonry trades														
c. Prepare details for misc. metals														
d. Prepare details for carpentry														
15. Preparation of presentation drawings														
a. Use of non-perspective pictorials														
b. Application of perspective drawings														
1. Pseudo perspective layout														
2. One-point perspective layout														
3. Two-point perspective construction														
4. Drawing three-point perspectives														
c. Rendering skill of presentation dwgs.														
1. Pencil treatment of pictorials														
2. Pen & ink techniques														
3. Wash techniques														
4. Water color rendering of pictorials														
5. Tempera application to pictorials														
6. Ink & Zip-a-tone techniques														
7. Airbrush rendering of pictorials														
8. Applications of shades & shadows														

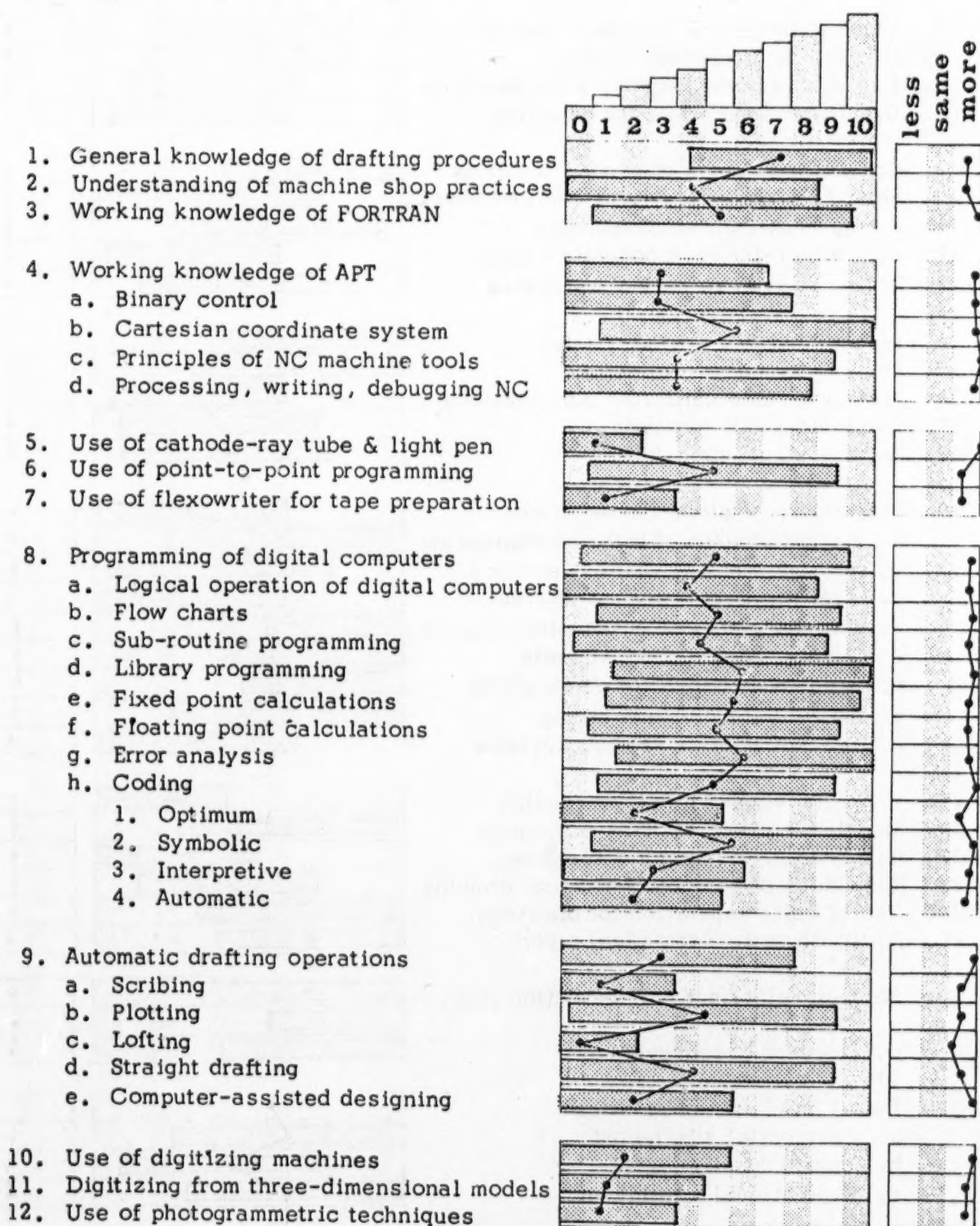
CIVIL DRAFTSMAN -- Drafts detailed construction drawings, topographical profiles, and related maps and specification sheets used in planning and construction of highways, river and harbor improvements, flood control, sewage and drainage systems, and other civil engineering projects.

1. Knowledge of elementary surveying
2. Route planning & layout
3. Use stereo-plotter
4. Know & apply photogrammetry



-
- Figure 1 consists of 10 diagrams arranged in two columns of five. The top diagram in the left column shows a path from point A to point B through a grid of obstacles (horizontal bars). The path is a simple line. The subsequent diagrams show the path being modified by adding more obstacles and changing the path's shape. The final diagram shows a path that is significantly more complex and longer than the initial one. The diagrams are labeled 'less', 'same', and 'more' on the right side, indicating the relative complexity of the paths.

COMPUTER DRAFTSMAN -- Plans program to set up and direct the operations of numerically controlled drafting machines.

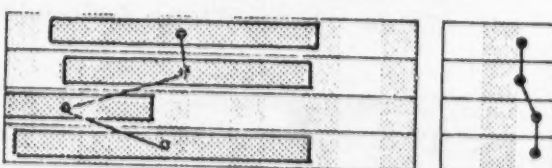
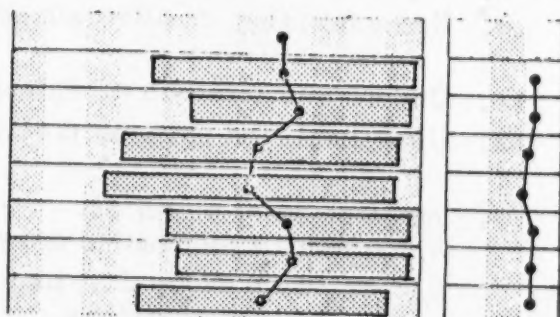
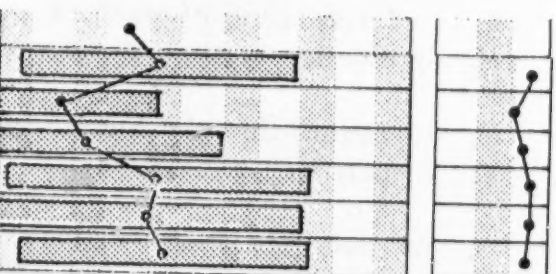
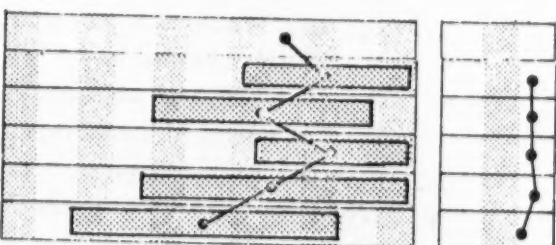
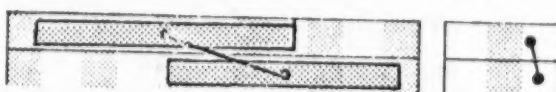
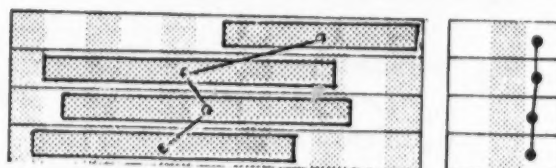
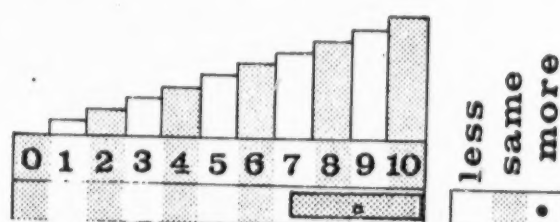


ELECTRICAL DRAFTSMAN
ELECTRONIC DRAFTSMAN

ELECTRO-MECHANICAL DRAFTSMAN

☐ Produces wiring and logic diagrams,
☐ schematics and layout drawings used in
☐ the manufacture, assembly, installation
and repair of electrical and electronic equipment. Solves mechanical and fabri-
cation problems through sketches and application of engineering theory.

1. Ability to work from sketches
2. Understanding of dimensioning
 - a. For numerical control
 - b. Application of tolerances & fits
 - c. Surface texture & finishes
3. Use geometric tolerances
4. Knowledge of electrical codes & stds.
5. Use of electrical & electronic symbols
 - a. Use one-line diagrams
 - b. Preparation of block diagrams
 - c. Use schematic diagrams
 - d. Application to layout drawings
 - e. Prepare pictorial diagrams & dwgs.
6. Understanding of Electronic Theory
 - a. Application of logic drawing
 - b. Use of cryogenic drafting
 - c. Drawing of microminiature circuits
 - d. Use integrated circuit layout
 - e. Preparation of printed circuit dwgs.
 - f. Knowledge of production processes
7. Representation of electrical system for:
 - a. Power systems
 - b. Control systems
 - c. Grounding systems
 - d. Lighting systems
 - e. Instrumentation systems
 1. Equipment arrangement drawings
 2. Cabinet and panel design
8. Knowledge of architectural drawing
9. Know & apply structural drawing
10. Ability to program for computer
11. Requirements for microfilm reproduction



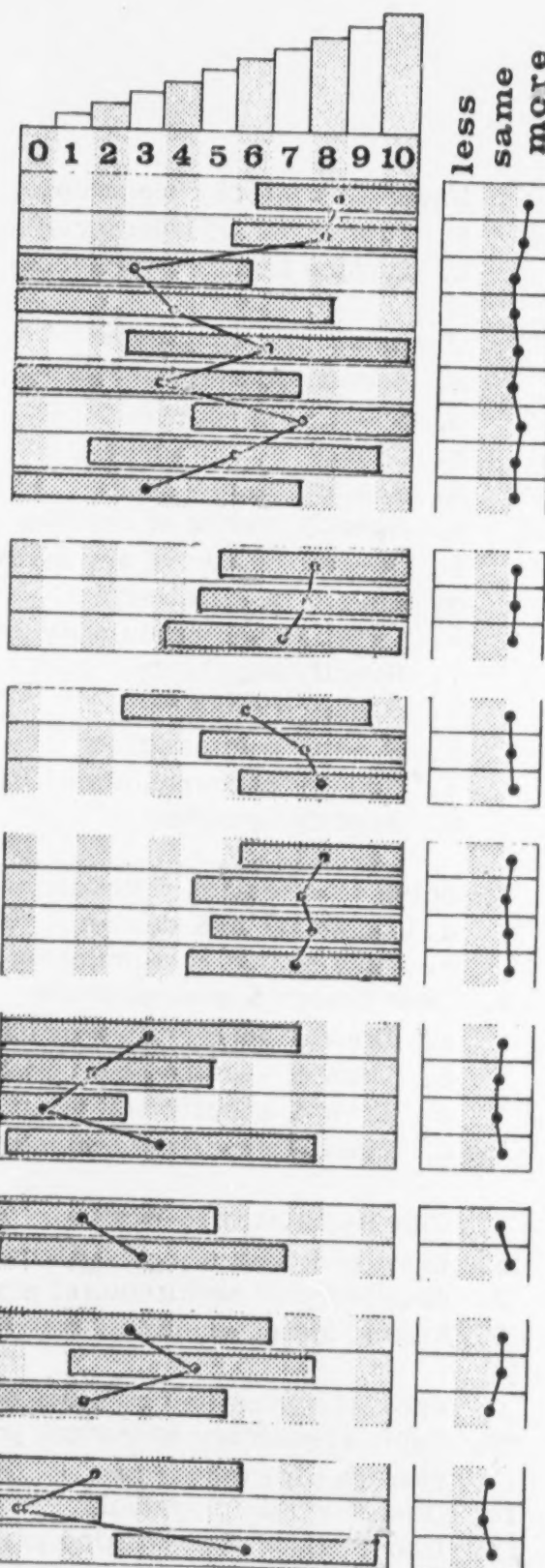
FOUNDry DRAFTSMAN -- Prepares drawings for castings which calls for special pattern making knowledge requiring attention to shrinking allowances and such factors as minimum radii of fillets and rounds.

	0 1 2 3 4 5 6 7 8 9 10	less same more
1. Freehand drawing skill		
2. General knowledge of pattern making		
a. Draw & specify fillets & rounds		
b. Draw & specify runouts		
3. Working knowledge of forming processes		
a. Casting methods		
1. Understand die casting methods		
2. Understand sand casting methods		
3. Shell castings		
4. Centrifugal castings		
5. Investment castings		
b. Forging processes		
c. Welding theory & representation		
4. Understanding of machine practices		
5. Knowledge of shop processes/operations		
6. Represent threads & fasteners		
7. Prepare detail drawings		
8. Prepare assembly drawings		
9. Representation of gears, pulleys & drives		
10. Understanding of dimensioning practices		
11. Understand strength of materials		
12. Use simplified drafting practices		
13. Preparation of pictorials		
a. Prepare axonometric drawings		
b. Prepare oblique drawings		
c. Prepare perspectives		
14. Solve intersections & developments		
15. Construct charts, graphs & nomographs		
16. Drafting for microfilm reproduction		

MAP DRAFTSMAN ☐
 MAPPER ☐
 TOPOGRAPHER ☐
 CARTOGRAPHER ☐
 PHOTOCARTOGRAPHER ☐

Delineates topographical drawings, identifies and locates roads, communities, structures, and installations. Analyzes survey data and legal records to determine location of natural or manmade features.

1. Preparation of maps & charts
 - a. Prepare plats
 - b. Prepare landscape maps
 - c. Prepare cadastral maps
 - d. Prepare topographic maps
 - e. Prepare hydrographic maps
 - f. Prepare engineering maps
 - g. Prepare highway plans & profiles
 - h. Prepare geological maps
2. Draw profiles & sections
3. Layout of contours
4. Freehand lettering skill for maps
5. Classify information for maps
6. Lay out traverses & surveys
7. Understanding of survey practices
8. Ability to work from field notes
9. Use of mapping instruments
10. Use of symbols
11. Prepare map revisions
12. Preparation of maps by projections
 - a. Prepare mercator projections
 - b. Prepare gnomonic projections
 - c. Prepare lambert projections
13. Ability to use stereo-plotter
14. Use photogrammetry
15. Prepare color separation for printing
16. Prepare diagrams & charts
17. Use well logging symbols
18. Prepare subsurface maps
19. Prepare mine & quarry maps
20. Detail site plans



MECHANICAL DRAFTSMAN ☐ -- Produces detailed working drawings or schematics of machinery and mechanical devices.

TOOL DESIGN DRAFTSMAN ☐ -- Specializes in plans for tool manufacturing, usually follows indicated designs and specifications of tool designer.

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
1. Understanding of dimensioning														
a. Application of tolerances and fits														
b. Surface texture & finishes														
2. Use geometric tolerances														
a. Specify flatness														
b. Specify roundness														
c. Specify straightness														
d. Specify cylindricity														
e. Specify profile of any line														
f. Specify profile of any surface														
g. Specify parallelism														
h. Specify perpendicularity														
i. Specify angularity														
j. Specify runout														
k. Specify true position														
l. Specify concentricity														
m. Specify symmetry														
3. Solve intersection & development probs.														
a. Duct layout & design														
b. Duct sizing & calculating														
4. Gear design & computations														
a. Draw & specify spur gears														
b. Draw & specify bevel gears														
c. Draw & specify helical gears														
d. Draw & specify worm gears														
5. Cam calculation & design														
6. Draw and design jugs & fixtures														
7. Knowledge of architectural plans														
8. Knowledge of structural drawing														
9. Know electrical-electronics drafting														
10. Apply elementary electrical principles														
11. Prepare pipe drawings														
12. Use of welding symbols														
13. Use of simplified drafting practices														

MECHANICAL DRAFTSMAN

TOOL DESIGN DRAFTSMAN

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
14. Knowledge of tool inspection procedures														
15. Knowledge of cutting tool design														
16. Knowledge of punch & die design														
17. Knowledge of gage design fundamentals														
18. Knowledge of elements of machine design														
a. Use of power transmissions equipment														
1. Gear drives														
2. Chain drives														
3. Belt drives														
4. Flexible shaft drives														
19. Specify manufacturing processes:														
a. Ferrous & nonferrous metals														
b. Machining & cutting tools														
c. Plastics														
d. Automation														
e. Numerical control														
f. Wood products														
20. Preparation of casting drawings														
21. Construct models for design analysis														
22. Solve mechanism & kinematics probs.														
23. Drafting for microfilm reproduction														

PIPING DRAFTSMAN -- Makes drawings for layout, construction, and operation of oil fields, refineries and pipeline systems from field notes and rough or detailed sketches and specifications.

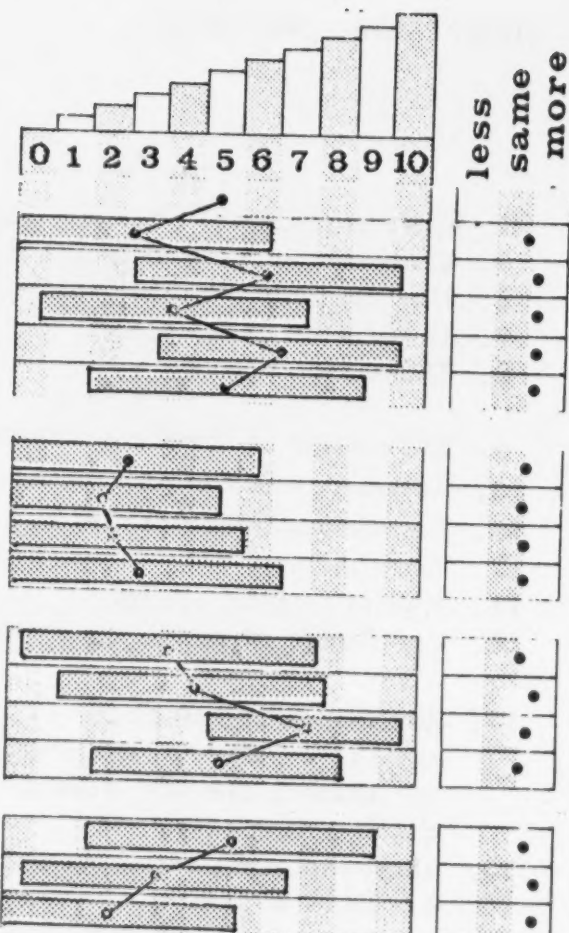
	0	1	2	3	4	5	6	7	8	9	10			
1. Use of piping specifications & materials														
2. Use of piping components & symbols														
a. Prepare single-line pipe drawings														
b. Prepare double-line pipe drawings														
3. Understanding of orthographic projection														
4. Use of simplified drafting practices														
5. Apply dimensioning practices														
6. Understanding of basic electrical design														
7. Understanding of basic instrumentation														
a. Detail instrument & control lines														
b. Detail control airline drawings														
c. Detail float control & alarm drawings														

PIPING DRAFTSMAN

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
8. Prepare architectural plans														
a. Detail plot plans														
b. Detail elevations														
9. Specify structural components														
a. Prepare structural steel specifications														
b. Prepare rebar specifications														
c. Specification of prestressed concrete														
d. Specify wood/timber construction														
10. Ability for basic structural detailing														
a. Prepare structural steel details														
b. Prepare reinforced concrete details														
c. Prepare prestressed concrete details														
d. Prepare wood/timber const. details														
11. Use Smoley's Trig. Handbook														
12. Lay out equipment arrangements for:														
a. Power plants														
b. Chemical plants														
c. Industrial plants														
d. High or low pressure systems														
e. Conveyor systems														
13. Knowledge of mechanical equipment														
14. Calculate & lay out pipe grades														
15. Representation of vessels														
a. Prepare dwgs. for heat exchangers														
b. Prepare drawings for towers														
c. Prepare drawings for drums														
d. Prepare drawings for tanks														
e. Prepare drawings for furnaces														
f. Prepare dwgs. for pressure vessels														
16. Construct models														
a. For design analysis														
b. For arrangement analysis														
c. For sales presentation														

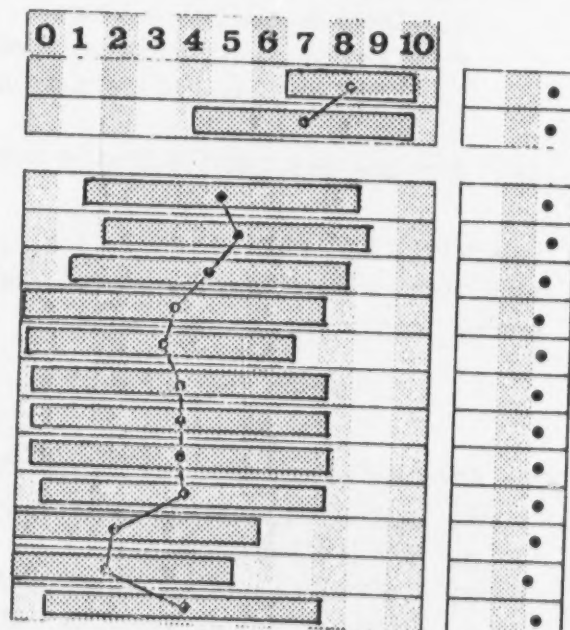
PIPING DRAFTSMAN

17. Preparation of drawings
 - a. Prepare dimetric pictorials
 - b. Prepare isometric pictorials
 - c. Prepare perspective drawings
 - d. Prepare developed pipe drawings
 - e. Prepare industrial layouts
18. Drafting of civil structures
 - a. Railroad layouts for industrial sites
 - b. Excavation detailing
 - c. Prepare drawings for dams & dykes
19. Preparation of nomographs
 - a. Use of critical path scheduling
 - b. Lay out flow diagrams
 - c. Prepare charts and graphs
20. Prepare cost & quantity estimates
21. Drafting for microfilm reproduction
22. Program for computer



SHEET METAL DRAFTSMAN -- Prepares scale layouts of sheet metal parts for installation of conveyor systems, air conditioning, heating, or ventilating equipment. Often required to mathematically establish the heat loss or gain, and volume capacities for conveyor or duct systems to determine equipment specifications for structures.

1. Knowledge of general drafting methods
2. Ability to make freehand drawings
3. Solve developments & intersections
 - a. Lay out by shortcut methods
 - b. Parallel line development and layout
 1. Lay out tee patterns
 2. Lay out elbow patterns
 3. Construct branches
 4. Miter construction
 - c. Radial line development and layout
 1. Use triangulation
 2. Use sweeping
 3. Use rollation
 - d. Layout combinations



SHEET METAL DRAFTSMAN:

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
4. Constructions of auxiliary views														
5. Construction of true length diagrams														
6. Use of revolution for problem solving														
7. Utilization of templates														
8. Dimension layouts														
9. Knowledge of sheeting materials														
10. Knowledge of forming processes														
11. Knowledge of bend radii														
12. Knowledge of edge-margin requirements														
13. Use of forming tables														
14. Knowledge of stamping & tooling														
15. Representation of clips & connectors														
a. Draw & specify government clips														
b. Draw & specify drive clips														
c. Standing seam														
16. Representation of seams and locks														
a. Draw & specify riveted joints														
b. Draw & specify notched joints														
c. Draw & specify solder joints														
d. Draw & specify welded joints														
17. Preparation of duct work drawings														
a. Draw & specify rectangular systems														
b. Draw & specify circular systems														
c. Draw & specify offsets														
d. Draw & specify elbows														
e. Draw & specify transitions														
f. Square-to-round transitions														
18. Prepare designs for louver construction														

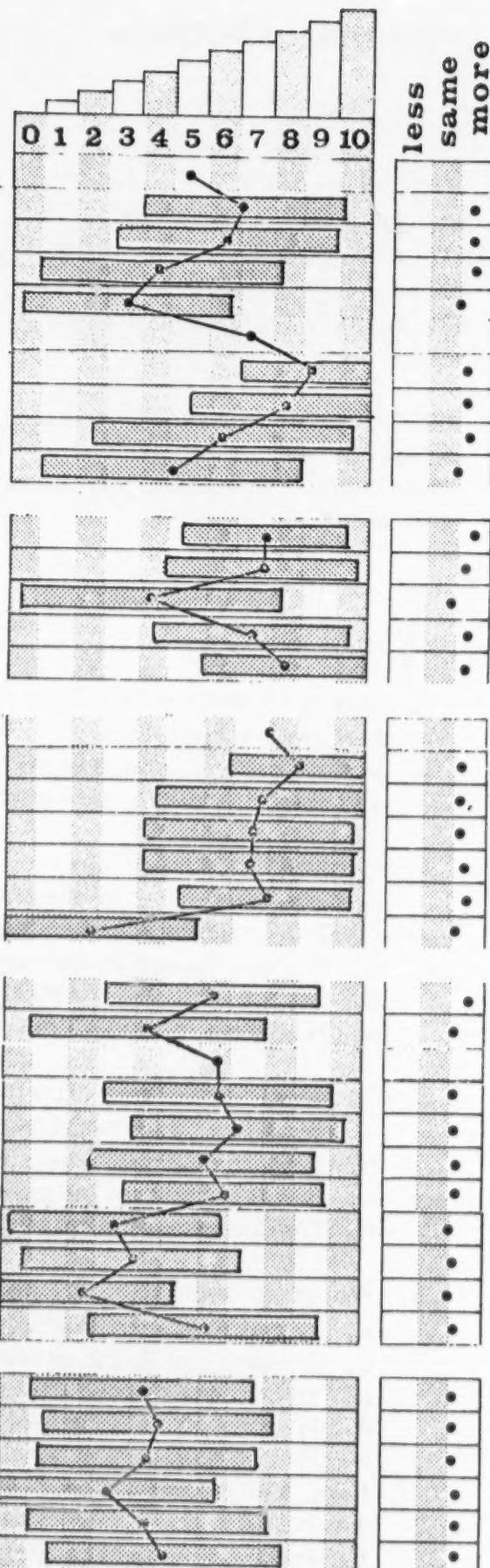
STRUCTURAL DRAFTSMAN -- Prepares engineering design and shop drawings for structures employing structural steel, reinforced or prestressed concrete, or timber members.

1. Knowledge of structural steel members
 - a. Bill of material preparation
 - b. Take-off procedures
 - c. Calculate weight of materials
 - d. Prepare cost & quantity estimates

	0	1	2	3	4	5	6	7	8	9	10			

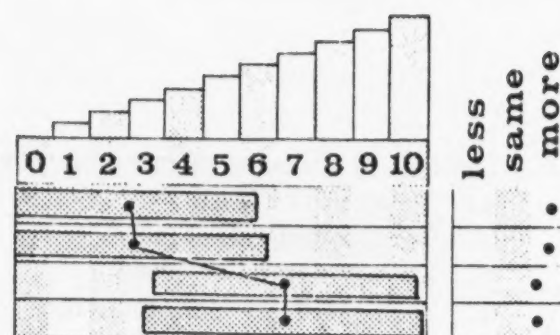
STRUCTURAL DRAFTSMAN

2. Design of structural components
 - a. Structural steel
 - b. Reinforced concrete
 - c. Prestressed concrete
 - d. Wood/timber construction
3. Prepare structural details
 - a. Structural steel
 - b. Reinforced concrete
 - c. Prestressed concrete
 - d. Wood/timber construction
4. Knowledge of shop fabrication methods
5. Representation of structural fasteners
 - a. Symbolic representation of rivets
 - b. Symbolic representation of bolts
 - c. Use welding symbols
6. Use of stds. & recommended practices
 - a. Use AISC Standards
 - b. Use CRSI Standards
 - c. Use Smoley's Tables
 - d. Use AWS (welding) Standards
7. Use simplified drafting practices
8. Application of color coding on dwgs.
9. Truss detailing
10. Draw shear & moment diagrams
11. Sizing of beam connections
 - a. Specify & detail seated connections
 - b. Specify & detail framed connections
 - c. Specify & detail skewed connections
 - d. Specify & detail special connections
12. Use machine finish symbols
13. Calculate & specify tolerances
14. Solve mechanism & kinematics problems
15. Use architectural standards & symbols
16. Know piping components & symbols
17. Solve intersection problems
18. Solve development problems
19. Nomograph construction & application
 - a. Prepare schedules
 - b. Use of calculations & charts



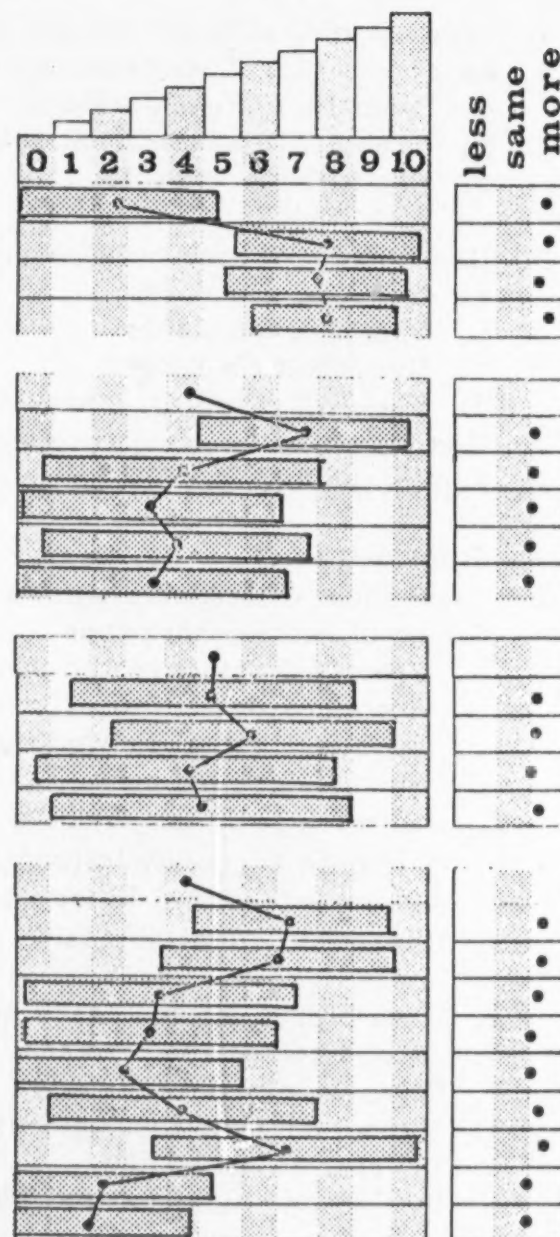
STRUCTURAL DRAFTSMAN

20. Program for computer
21. Requirements for microfilm reproduction
22. Specify & detail anchor bolt plans
23. Specify foundation details



TECHNICAL ILLUSTRATORS -- Specializes in illustrations for reproduction in reference works, brochures, and technical manuals dealing with the assembly, installation, operation, maintenance, and repair of machines, tools, and equipment.

1. Ability to write a technical report
2. Ability to illustrate technical reports
3. Understanding of multiview projection
 - a. Freehand technical sketching skill
4. Preparation of drawings
 - a. Prepare isometric drawings
 - b. Prepare dimetric drawings
 - c. Prepare trimetric drawings
 - d. Parallel oblique drawings
 - e. Prepare angular oblique drawings
5. Preparation of perspective drawings
 - a. Prepare one-point perspectives
 - b. Prepare two-point perspectives
 - c. Prepare three-point perspectives
 - d. Prepare pseudo perspectives
6. Prepare presentation drawings
 - a. Prepare pencil illustrations
 - b. Prepare pen & ink renderings
 - c. Prepare wash renderings
 - d. Prepare water color renderings
 - e. Prepare tempera renderings
 - f. Prepare airbrush renderings
 - g. Prepare ink & Zip-a-tone drawings
 - h. Prepare scratchboard illustrations
 - i. Prepare coquille board illustrations



TECHNICAL ILLUSTRATORS -- Continued

	0	1	2	3	4	5	6	7	8	9	10	less	same	more
7. Use of shades & shadows on drawings														
8. Application of photoprinting methods														
a. Knowledge of half-tone processes														
b. Use color separation processes														
c. Use photo retouching														
d. Preparation of work for printing														
9. Application of silkscreening														
10. Use doubltone (Craftint)														
11. Advertising layout & design ability														
12. Brochure design ability														
13. Use of time saving devices														
a. Lettering aids														
b. Templates														
c. Appliques (transfer films, etc.)														
14. Knowledge of machine design														
15. Knowledge of mechanisms & kinematics														
16. Knowledge of art & design principles														
17. Preparation of visual aids														
a. Prepare transparencies & overlays														
b. Prepare flip charts														
c. Prepare photographic slides														
d. Prepare display models														
e. Prepare schematics & diagrams														

MEDIAN SALARIES OF JOB CLASSIFICATION LEVELS

Levels of Job Classifications	Starting	Average	Maximum
1	\$439.76	\$547.12	\$670.15
1	409.63	525.25	622.67
2	501.39	657.46	775.50
1	381.58	483.50	539.17
2	497.16	614.71	698.84
3	648.68	755.28	873.08
1	378.33	426.09	483.50
2	488.56	571.91	641.71
3	584.58	657.46	775.50
4	671.38	771.73	894.81
1	371.43	436.11	496.68
2	474.71	542.44	589.77
3	532.62	615.71	721.15
4	646.52	711.73	826.76
5	740.92	830.83	---
1	375.00	431.82	477.08
2	468.32	498.68	541.95
3	532.21	577.44	674.36
4	642.15	696.04	750.50
5	717.30	745.86	889.62
6	789.33	830.83	---
1	383.33	375.00	475.00
2	441.75	533.60	500.00
3	466.80	594.83	662.43
4	519.28	674.36	767.20
5	662.43	692.25	828.86
6	692.25	858.50	---
7	783.80	858.50	---

FORMULA USED IN CALCULATING MEDIANS

$$\text{Mdn} = l + \frac{(\frac{n}{2} - F) i}{f}$$

$$= 400 + \frac{(21 - 16) (168)}{21}$$

$$= 400 + \frac{(5) (168)}{21}$$

$$= 400 + \frac{840}{21}$$

$$= 400 + 40 = 440$$

Where

l = lower limit of class interval containing median

n = number of observations

F = cumulative frequency up to class interval containing median

f = frequency within the class interval containing median

i = class interval size = 168

APPENDIX D-- Planning Forms

Enrollment Estimation

Specialty Program Selection

Specialty Course Selection

Summary of Course Offerings

Specialty Courses of Study

Staffing Estimation

Drafting Room Estimation

Drafting Room Equipment

Offices and Equipment

Visual-Aid Equipment

Teaching Aids

Facilities Cost Summary

FORM II-B-1

ENROLLMENT ESTIMATION*

IF YOU ARE PLANNING A NEW SCHOOL, complete this form to estimate D & DT program enrollment.

Estimated Total School Enrollment _____ (1)

Estimated Vocational-Technical Enrollment
(.325 of line (1)) _____ (2)

Estimated D & DT Program Enrollment
(.139 of line (2)) _____ (3)

Summary of Estimated Enrollments:

Estimated D & DT Enrollment from line (3) _____ (A)

Estimated Vocational-Technical Enrollment
from line (2) _____ (B)

Estimated Total Enrollment from line (1) _____ (C)

TURN TO PAGE 18 for a discussion of curriculum development.

*See Section III-A for source of prediction criteria.

FORM II-B-2

ENROLLMENT ESTIMATION*

IF YOU ARE ADDING A VOCATIONAL-TECHNICAL PROGRAM TO YOUR SCHOOL, complete this form to estimate D & DT program enrollment.

Present Total School Enrollment _____ (1)

Estimated Vocational-Technical Enrollment
(.481 of line (1)) _____ (2)

Estimated D & DT Enrollment
(.139 of line (2)) _____ (3)

Estimated Total Enrollment After Adding Vocational-
Technical Program (sum of lines (1) and (2)) _____ (4)

Summary of Estimated Enrollments:

Estimated D & DT Enrollment from line (3) _____ (A)

Estimated Vocational-Technical Enrollment
from line (2) _____ (B)

Estimated Total Enrollment from line (4) _____ (C)

TURN TO PAGE 18 for a discussion of curriculum development.

* See Section III-A for source of prediction criteria.

FORM II-B-3

ENROLLMENT ESTIMATION*

IF YOU ARE ADDING A D & DT PROGRAM TO YOUR EXISTING VOCATIONAL-TECHNICAL PROGRAM, complete this form to estimate D & DT enrollment.

- Present Total School Enrollment _____ (1)
- Present Vocational-Technical Enrollment _____ (2)
- Estimated D & DT Enrollment (.161 of line (2)) _____ (3)
- Estimated Vocational-Technical Enrollment After
Adding D & DT Program (sum of lines (2) and (3)) _____ (4)
- Estimated Total Enrollment After Adding D & DT
Program (sum of lines (1) and (3)) _____ (5)
-

Summary of Estimated Enrollments:

- Estimated D & DT Enrollment from line (3) _____ (A)
- Estimated Vocational-Technical Enrollment
from line (4) _____ (B)
- Estimated Total Enrollment from line (5) _____ (C)

TURN TO PAGE 18 for a discussion of curriculum development.

*See Section III-A for source of prediction criteria.

FORM II-C-1

SPECIALTY TYPE SELECTION

(Number of specialty draftsmen employed
in Texas industrial regions*)

TYPES OF DRAFTSMEN (Check those which apply) ↓	REGION (See map, page 28) (Circle those which apply)						Total of Applicable Sections
	1	2	3	4	5	6	
☐ Aeronautical	0	7	0	0	4	68	
☐ Architectural	20	100	32	5	24	113	
☐ Civil	48	154	3	25	19	273	
☐ Electrical	36	50	4	6	12	130	
☐ Electro-Mechanical	40	349	38	0	12	149	
☐ Electronic	0	109	10	0	4	25	
☐ Mapping	15	18	54	21	72	181	
☐ Mechanical	57	643	18	20	11	286	
☐ Oil & Gas (Piping)	27	20	0	12	16	380	
☐ Structural	30	134	77	11	23	352	
☐ Technical Illustration	1	118	8	0	8	72	
☐ Tool Design	1	96	5	5	10	27	

*Based upon a survey of 329 industrial firms.

FORM II-C-2A

NON-DRAFTING COURSES RECOMMENDED
IN ADDITION TO BASIC CORE COURSES

Courses

Symbols in this form
indicate the following:

- Required Courses
○ Recommended
Electives

(Check those
selected)

Drafting Specialty

	Public Speaking	Chemistry	Biology	Analytic Geometry	Calculus	Numerical Analysis	Electronic Technology	Surveying	Aeronautical Technology	Computer Programming	Numerical Control	History	Government	Business Administration
☐ Aeronautical				○					○	○	○			
☐ Architectural	○			○				○						○
☐ Civil				○				○		○	○			○
☐ Electrical				○			○							
☐ Electro-Mechanical		○		○	○	○	○		○	○	○			
☐ Electronic		○		○			○							
☐ Mapping				○	○			○		○	○			○
☐ Mechanical				○	○	○			○	○				
☐ Oil & Gas (Piping)		○		○				○						○
☐ Structural				○				○	○	○	○			
☐ Technical Illustration	○	○	○				○							○
☐ Tool Design				○	○	○			○	○				
Summary														

FORM II-C-2B

DRAFTING COURSES RECOMMENDED
IN ADDITION TO BASIC CORE COURSES

Courses

Symbols in this form
indicate the following:

- Required Courses
○ Recommended
Electives

(Check those
selected)

Drafting Specialty

	Aeronautical	Architectural II	Structural II	Technical Illustration I	Technical Illustration II	Computer Graphics	Machine & Tool Design	Cartography	Sheet Metal Drafting	Piping Drafting	Pattern, Foundry & Forging Drawing	Graphical Analysis
☐ Aeronautical	●			○		○			○	○		○
☐ Architectural		○	○	○	○			○		○		
☐ Civil			○	○		○		○		○		○
☐ Electrical	○			○			○		○	○		○
☐ Electro-Mechanical				○		○	○		○	○	○	
☐ Electronic	○			○		○	○		○			○
☐ Mapping				○		○		○		○		○
☐ Mechanical				○		○	○		○	○	○	
☐ Oil & Gas (Piping)				○			○	○	○			○
☐ Structural			○	○		○			○		○	○
☐ Technical Illustration	○	○		○	○		○					○
☐ Tool Design				○		○	○				○	○
Summary												

FORM II-C-3

Summary of Course Offerings

(Supply the appropriate courses from FORMS II-C-2A
and II-C-2B in the blank spaces.)

Communicative Arts:

Required: Composition & Rhetoric
Technical Writing

Electives: _____

Basic Science:

Required: Physics I--Statics & Mechanics
Physics II--Heat, Light & Electricity

Electives: _____

Mathematics:

Required: College Algebra
Trigonometry

Electives: _____

FORM II-C-3--Continued

Engineering Technology:

Required: Manufacturing Materials & Processes
Shop Practice

Electives:

Humanities, Business, Social Studies:

Required: Orientation

Electives:

Health & Physical Education:

Required: Health & Physical Education I
Health & Physical Education II

Electives:

FORM II-C-3--Continued

Drafting:

Required: Basic Drafting
Machine Drafting
Building Construction Drafting I
Descriptive Geometry
Electrical & Electronic Drafting
Structural Drafting I

Electives:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

FORM II-C-4A

Job Title: Aeronautical Draftsman

Job Description: Performs duties of Draftsman I, specializing in drafting engineering drawings of developmental or production airplanes and missiles and ancillary equipment, including launch mechanisms and scale models of prototype aircraft, as planned by Aeronautical Engineer.

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 1.7%

Suggested Course of Study:

First Semester

Composition and Rhetoric	(3-0) 3*
College Algebra	(3-0) 3
Orientation	(2-0) 2
Manufacturing Materials and Processes	(3-0) 3
Basic Drafting	(2-4) 3
Building Construction Drafting I	(2-4) 3
Physical Education I	R
TOTAL	(15-8) 17

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Aeronautical Technology	(3-0) 3
Physical Education II	R
	(15-12) 18

*These figures are interpreted as 3 clock hours lecture and zero clock hours laboratory per week; 3 credit hours.

FORM II-C-4A--Continued

Third Semester

Physics I	(3-4) 4
Electrical and Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Technical Illustration I	(2-4) 3
Science or Math Elective:	
	<u>(3-0) 3</u>
TOTAL	(12-16) 16

Fourth Semester

Physics II	(3-4) 4
Aeronautical Drafting	(2-4) 3
Social Studies Elective:	
	(3-0) 3
General Elective:	
	() 3
General Elective:	
	<u>() 3</u>
TOTAL	() 16

FORM II-C-4B

Job Title: Architectural Draftsman

Job Description: Performs duties of Draftsman I by planning artistic architectural and structural features of any class of buildings and like structures: Sketches designs and details, using drawing instruments. Makes engineering computations involved in the strength of material, beams, and trusses. Estimates quantities needed for project and computes cost. Makes freehand drawings of proposed structure when necessary to clarify plans. May specialize in planning architectural details according to structural materials used as Tile and Marble Draftsman.

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 6.3%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A,
Aeronautical Draftsman, page 44 .)

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Surveying	(3-0) 3
Physical Education II.	R
TOTAL	(15-12) 18

FORM II-C-4B--Continued

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Technical Illustration I	(2-4) 3
Science or Math Elective:	
	(3-0) 3
TOTAL	(12-16) 16

Fourth Semester

Physics II	(3-4) 4
Technical Illustration II	(2-4) 3
Building Construction Drafting II	(2-4) 3
Social Studies Elective:	
	(3-0) 3
General Elective:	
	() 3
TOTAL	() 16

FORM II-C-4C

Job Title: Civil Draftsman

Job Description: Drafts detailed construction drawings, topographical profiles, and related maps and specification sheets used in planning and construction of highways, river and harbor improvements, flood control, drainage, and other civil engineering projects, performing duties as described under Draftsman I: Plots maps and charts showing profiles and cross sections, indicating relation of topographical contours and elevations to buildings, retaining walls, tunnels, overhead powerlines, and other structures. Drafts detailed drawings of structures and installations, such as roads, culverts, fresh water supply and sewage disposal systems, dikes, wharfs, and breakwaters. Computes volume of tonnage of excavations and fills, and prepares graphs and hauling diagrams used in earthmoving operations. May accompany survey crew in field to locate grading markers or to collect data required for revision of construction drawings. May be designated according to type of construction as Reinforced Concrete Draftsman or Water and Sewage Draftsman.

The above description also fits the following titles: Civil Engineering Draftsman, Engineering Draftsman, Construction Draftsman.

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 11.1%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A
Aeronautical Draftsman, page 44.)

FORM II-C-4C--Continued

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Surveying	(3-0) 3
Physical Education II	R
TOTAL	(15-12) 18

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Map & Topographic Drafting	(2-4) 3
Science or Math Elective:	
	(3-0) 3
TOTAL	(12-16) 16

Fourth Semester

Physics II	(3-4) 4
Structural II	(2-4) 3
Social Studies Elective:	
	(3-0) 3
General Elective:	
	() 3
General Elective:	
	() 3
TOTAL	() 16

FORM II-C-4D

Job Title: Electrical Draftsman

Job Description: Performs duties of Draftsman I in preparing electrical equipment working drawings and wiring diagrams used by construction crews and repairmen who erect, install, and repair electrical equipment and wiring in powerplants, industrial establishments, commercial or domestic buildings, or electrical distribution systems.

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 5.1%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A,
Aeronautical Draftsman, page 44.)

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Electronic Technology	(3-0) 3
Physical Education II	R
TOTAL	(15-12) 18

FORM II-C-4D--Continued

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Machine & Tool Drafting	(2-4) 3
Science or Math Elective:	
TOTAL	(3-0) 3 (12-16) 16

Fourth Semester

Physics II	(3-4) 4
Piping Drafting	(2-4) 3
Social Studies Elective:	
	(3-0) 3
General Elective:	
	() 3
General Elective:	
	() 3
TOTAL	() 16

FORM II-C-4E

Job Title: Electro-Mechanical Draftsman

Job Description: (No formal job description is given in the Dictionary of Occupational Titles; however, many industrial respondents classified their drafting personnel in this category. It is suggested that the job descriptions for the Electrical Draftsman, FORM II-C-4D, Electronic Draftsman, FORM II-C-4F, and Mechanical Draftsman, FORM II-C-4H, be used as a guide.)

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 12.5%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A, Aeronautical Draftsman, page 44 .)

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Electronic Technology	(3-0) 3
Physical Education II	R
TOTAL	(15-12) 18

FORM II-C-4E--Continued

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Technical Illustration I	(2-4) 3
Analytic Geometry	(3-0) 3
TOTAL	(12-16) 16

Fourth Semester

Physics II	(3-4) 4
Machine & Tool Drafting	(2-4) 3
Social Studies Elective:	
General Elective:	(3-0) 3
General Elective:	() 3
TOTAL	() 3
	() 16

FORM II-C-4F

Job Title: Electronic Draftsman

Job Description: Drafts wiring diagrams, schematics, and layout drawings used in manufacture, assembly, installation, and repair of electronic equipment, such as television cameras, radio transmitters and receivers, audioamplifiers, computers, and radiation detectors, performing duties as described under Draftsman I. Drafts layout and detail drawings of racks, panels, and enclosures. May conduct service and interference studies and prepare maps and charts related to radio and television surveys. May be designated according to equipment drafted as Radio Draftsman (radio & tv broad.).

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 3.1%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A, Aeronautical Draftsman, page 44.)

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Electronic Technology	(3-0) 3
Physical Education II	R
TOTAL	(15-12) 18

FORM II-C-4F--Continued

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Technical Illustration I	(2-4) 3
Science or Math Elective:	
	(3-0) 3
TOTAL	(12-16) 16

Fourth Semester

Physics II	(3-4) 4
Sheet Metal Drafting	(2-4) 3
Social Studies Elective:	
	(3-0) 3
General Elective:	
	() 3
General Elective:	
	() 3
TOTAL	() 16

FORM II-C-4G

Job Title: Map Draftsman

Job Description: Draws maps of cities, counties, States, and other areas showing location and identity of roads, communities, commercial or industrial structures and installations, political boundaries, and other features, performing duties as described under Draftsman I: Analyzes survey data, reference maps, and other records to determine location of features, such as primary or secondary roads, overhead powerlines, underground pipelines, oil wells, and railroad tracks. Studies deeds, leases, statutes, and other legal records to establish boundary lines of cities, boroughs, States, counties, districts, regions, and other politically, socially, or economically determined areas. May originate and revise maps related to commercial or industrial property or contracts and be designated Records Draftsman. Maps concerned with representation of topographical or subsurface geological data are drawn by Geological Draftsman (petrol. production) and Topographical Draftsman.

The above description also fits the following titles: Cartographer, Map Maker, Mapper.

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 7.7%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A,
Aeronautical Draftsman, page 44 .)

FORM II-C-4G--Continued

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Surveying	(3-0) 3
Physical Education II	R
TOTAL	(15-12) 18

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Technical Illustration I	(2-4) 3
Science or Math Elective:	
	(3-0) 3
TOTAL	(12-16) 16

Fourth Semester

Physics II	(3-4) 4
Map & Topographic Drafting	(2-4) 3
Social Studies Elective:	
	(3-0) 3
General Elective:	
	() 3
General Elective:	
	() 3
TOTAL	() 16

FORM II-C-4H

Job Title: Mechanical Draftsman

Job Description: Performs duties of Draftsman I specializing in drafting detailed working drawings of machinery and mechanical devices, indicating dimensions and tolerances, fasteners and joining requirements, and other engineering data. Drafts multiple-view assembly and subassembly drawings as required for manufacture and repair of mechanisms.

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 22.0%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A,
Aeronautical Draftsman, page 44.)

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Computer Programming	(3-0) 3
Physical Education II	R
TOTAL	(15-12) 18

FORM II -C-4H--Continued

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Technical Illustration I	(2-4) 3
Analytic Geometry	(3-0) 3
TOTAL	(12-16) 16

Fourth Semester

Physics II	(3-4) 4
Machine & Tool Drafting	(2-4) 3
Social Studies Elective:	
_____	(3-0) 3
General Elective:	
_____	() 3
General Elective:	
_____	() 3
TOTAL	() 16

FORM II-C-4I

Job Title: Oil & Gas (Piping) Draftsman

Job Description: Drafts plans and drawings for layout, construction, and operation of oil fields, refineries, and pipeline systems from field notes, rough or detailed sketches, and specifications: Develops detail drawings for construction of equipment and structures, such as drilling derricks, compressor stations, gasoline plants, frame, steel, and masonry buildings, piping manifolds and pipeline systems, and for manufacture, fabrication, and assembly of machines and machine parts. Prepares maps of pipeline systems and oil and gas locations, using field survey notes and aerial photographs. May draft topographical maps, or develop maps to represent geological stratigraphy and locations of oil and gas deposits, using geological and geophysical prospecting and surveying data.

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 9.7%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A,
Aeronautical Draftsman, page 44 .)

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Surveying	(3-0) 3
Physical Education	R
TOTAL	(15-12) 18

FORM II-C-4I--Continued

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Pipe & Vessel Detailing	(2-4) 3
Chemistry	(3-0) 3
TOTAL	(12-16) 16

Fourth Semester

Physics II	(3-4) 4
Map & Topographic Drafting	(2-4) 3
Social Studies:	
_____	(3-0) 3
General Elective:	
_____	() 3
General Elective:	
_____	() 3
TOTAL	() 16

FORM II-C-4J

Job Title: Structural Draftsman

Job Description: Performs duties of Draftsman I by drawing plans for structures employing structural steel, such as bridge trusses, plate girders, roof trusses, trestle bridges and columns, and other integral parts. Makes drawings for masonry or timber members.

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 13.3%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A,
Aeronautical Draftsman, page 44.)

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Engineering Technology Elective:	
	(3-0) 3
Physical Education II	R
TOTAL	(15-12) 18

FORM II-C-4J--Continued

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Analytic Geometry	(3-0) 3
Drafting Elective:	
	<u>(2-4) 3</u>
TOTAL	(12-16) 16

Fourth Semester

Physics II	(3-4) 4
Structural Drafting II	(2-4) 3
Social Studies Elective:	
	(3-0) 3
General Elective:	
	() 3
General Elective:	
	<u>() 3</u>
TOTAL	() 16

FORM II-C-4K

Job Title: Technical Illustrator

Job Description: Lays out and draws illustrations for reproduction in reference works, brochures, and technical manuals dealing with assembly, installation, operation, maintenance, and repair of machines, tools, and equipment: Prepares drawings from blueprints, designs, mockups, and photoprints by methods and techniques suited to specified reproduction process or final use, such as blueprint, photo-offset, and projection transparencies, using drafting and optical equipment. Lays out and draws schematic perspective, orthographic, or oblique-angle views to depict function, relationship, and assembly sequence of parts and assemblies, such as gears, engines, and instruments. Shades or colors drawing to emphasize details or to eliminate undesired background, using ink, crayon, airbrush, and overlays. Pastes instructions and comments in position on drawing. May draw cartoons and caricatures to illustrate operation, maintenance, and safety manuals and posters.

The above description also fits the following titles: Engineering Illustrator, Production Illustrator.

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 4.4%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A,
Aeronautical Draftsman, page 44 .)

FORM II-C-4K--Continued

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Engineering Technology Elective:	
	(3-0) 3
Physical Education II	R
	(15-12) 18
TOTAL	

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Technical Illustration I	(2-4) 3
Analytic Geometry	(3-0) 3
TOTAL	(12-16) 16

Fourth Semester

Physics II	(3-4) 4
Technical Illustration II	(2-4) 3
Social Studies Elective:	
	(3-0) 3
General Elective:	
	() 3
General Elective:	
	() 3
TOTAL	() 16

FORM II-C-4L

Job Title: Tool Design Draftsman

Job Description: Same description as Mechanical Draftsman with the addition of the following: Specializes in drawing plans for manufacture of tools, usually following designs and specifications in indicated by Tool Designer.

Percent of total drafting personnel surveyed in Texas who are employed in the above capacity (1969): 3.1%

Suggested Course of Study:

First Semester

(Common to all areas; see FORM II-C-4A,
Aeronautical Draftsman, page 44.)

Second Semester

Technical Writing	(3-0) 3
Trigonometry	(3-0) 3
Shop Practice	(2-4) 3
Machine Drafting	(2-4) 3
Descriptive Geometry	(2-4) 3
Computer Programming	(3-0) 3
Physical Education II	R
TOTAL	(15-12) 18

Third Semester

Physics I	(3-4) 4
Electrical & Electronic Drafting	(2-4) 3
Structural Drafting I	(2-4) 3
Technical Illustration I	(2-4) 3
Analytic Geometry	(3-0) 3
TOTAL	(12-16) 16

FORM II-C-4L--Continued

Fourth Semester

Physics II	(3-4) 4
Machine & Tool Drafting	(2-4) 3
Social Studies Elective:	
_____	(3-0) 3
General Elective:	
_____	() 3
_____	() 3
TOTAL	() 16

FORM II-D-1

USE THIS FORM TO MAKE AN INITIAL ESTIMATE OF THE NUMBER OF
FULL-TIME DRAFTING INSTRUCTORS NEEDED.

Estimated D & DT Enrollment from line (A) of
enrollment prediction form II-B-1, II-B-2,
or II-B-3, as appropriate _____ (1)

Initial estimate of number of instructors needed
(.024 of line (1), raised to next whole number) . . . _____ (2)

Specialty Drafting Courses to be offered (Form II-C-3)

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Estimated number of specialty instructors (assume
one for each unique specialty area)
needed to teach the above courses _____ (3)

Estimated number of additional general instructors needed
(line (2) minus line (3), but not less than zero) . . _____ (4)

Estimated total number of instructors needed
(line (3) plus line (4)) _____ (5)

TURN TO PAGE 189 for a discussion of facilities and
equipment.

FORM II-E-1

ESTIMATION OF NUMBER OF DRAFTING
ROOMS NEEDED

- D & DT Enrollment (from Form II-B-1, II-B-2,
or II-B-3). _____ (1)
- Divide line (1) by the average number of students
per section _____ (2)
- Maximum number of different drafting courses scheduled
for the same students in any one semester. _____ (3)
- Multiply line (2) by line (3) _____ (4)
- Average room utilization, hours per week per room. . . _____ (5)
- Average number of clock hours per week for one section _____ (6)
- Divide line (5) by line (6) _____ (7)
- Divide line (4) by line (7); round to next whole number. _____ (8)

The last figure, line (8), is an estimate of the number of
rooms needed. Note that an excessive number of rooms needed
may be reduced by any or all of the following:

1. Enlarging section size (line (2))
2. Reducing the multiplicity of courses scheduled per
semester (line (3))
3. Increasing room utilization (line (5))

TURN TO PAGE 193 for a discussion of drafting room facilities.

FORM II-E-2A

FACILITIES FOR ADVANCED DRAFTING ROOM
(18-24 STUDENT CAPACITY)

Item	Recommended Quantity	Estimated Quantity Needed	Unit Cost	Total Cost
A. Minimum requirements				
Drafting tables	18-24	X	(Range) to	(Range) to
Drafting chairs	18-24	X	to	to
Drafting machines, table	1 per table	X	to	to
Drafting machines, chalkboard	1	X	to	to
Instructor's desk, drafting room	1	X	to	to
Instructor's chair, drafting room	1	X	to	to
Wash basin with cabinets	1	X	to	to
		Minimum Requirements	Sub-total	(1)
B. Additional Facilities				
Bulletin boards	2	X	to	to
Display case, drafting room	2	X	to	to
File cabinet	1	X	to	to
Light table	1	X	to	to
Map storage cabinet	1	X	to	to
Overhead projector	1	X	to	to
Paper cutter	1	X	to	to
Projection screen, permanently mounted	1	X	to	to
		Additional Facilities	Sub-total	(2)

FORM II-E-2A (Continued)

FACILITIES FOR ADVANCED DRAFTING ROOM--Continued

Item	Recommended Quantity	Estimated Quantity Needed	Unit Cost	Total Cost
C. Small equipment items				
Lead pointers	5	X	(Range) to	(Range) to
Lettering sets	5	X	to	to
Pencil sharpeners, draftsman	1	X	to	to
Pencil sharpeners, regular	1	X	to	to
Technical fountain pen sets (3-7 pens)	4	X	to	to
Template, assortment	24	X	to	to
		Small Equipment Sub-total	=	(3)
		ADVANCED DRAFTING ROOM FACILITIES TOTAL		to (4)

TURN TO FORM II-E-2B, page , to estimate beginning drafting room facilities.

FORM II-E-2B

FACILITIES FOR BEGINNING DRAFTING ROOM
(20-30 STUDENT CAPACITY)

Item	Recommended Quantity	Estimated Quantity Needed	Unit Cost	Total Cost
A. Minimum requirements				
Drafting tables	20-30	X	(Range) to to	(Range) to to
Drafting chairs	20-30	X	to to	to to
Drafting machines, table	1 per table	X	to to	to to
Drafting machines, chalkboard	1	X	to to	to to
Instructor's desk, drafting room	1	X	to to	to to
Instructor's chair, drafting room	1	X	to to	to to
Wash basin with cabinets	1	X	to to	to to
		Minimum Requirements Sub-total		(1)
B. Additional Facilities				
Bulletin boards	2	X	to to	to to
Display case, drafting room	2	X	to to	to to
File cabinet	1	X	to to	to to
Light table	1	X	to to	to to
Map storage cabinet	1	X	to to	to to
Overhead projector	1	X	to to	to to
Paper cutter	1	X	to to	to to
Projection screen, permanently mounted	1	X	to to	to to
		Additional Facilities Sub-total		(2)

FORM II-E-2B (Continued)

FACILITIES FOR BEGINNING DRAFTING ROOM--Continued

Item	Recommended Quantity	Estimated Quantity Needed	Unit Cost	Total Cost
C. Small equipment items				
Lead pointers	5	X	(Range) to to	(Range) to to
Lettering sets	5	X	=	=
Pencil sharpeners, draftsman	1	X	=	=
Pencil sharpeners, regular	1	X	=	=
Technical fountain pen sets (3-7 pens)	4	X	=	=
Template, assortment	30	X	=	=
		Small Equipment Sub-total	to to	to to (3)
		BEGINNING DRAFTING ROOM FACILITIES TOTAL		
		(Sum of lines (1), (2), and (3))		to to (4)

TURN TO PAGE for a discussion of instructors' offices.

FORM II-E-3

FACILITIES FOR EACH OFFICE

Item	Recommended Quantity	Estimated Quantity Needed	Unit Cost	Total Cost
Office Facilities				
A. Minimum recommendations				
Desk	1	X	to	to
Chair, swivel	1	X	to	to
Chair, regular	2	X	to	to
Minimum Recommendations Sub-Total				(1)
B. Additional facilities				
Adding machine	1	X	to	to
Drafting table	1	X	to	to
Drafting machine	1	X	to	to
Drafting chair	1	X	to	to
Flat files (5-drawer unit)	1	X	to	to
File cabinet	1	X	to	to
Telephone	1	X	to	to
Typewriter	1	X	to	to
Additional Facilities Sub-Total				(2)
OFFICE FACILITIES TOTAL				(3)

TURN TO PAGE for a discussion of departmental storage, and utility-teacher preparation facilities, including reproduction equipment.

FORM II-E-4

FACILITIES FOR A UTILITY-TEACHER PREPARATION ROOM

Item	Recommended Quantity	Estimated Quantity Needed	Unit Cost	Total Cost
Utility-Preparation Room				
Built-in cabinets				
Counters		X	(Range) to	(Range) to
Flat files (five-drawer)	2	X	to	to
File cabinets	2	X	to	to
Metal cabinet	2	X	to	to
Paper cutter, table model	1	X	to	to
Reproduction machine	1	X	to	to
Sink	1	X	to	to
UTILITY-TEACHER PREPARATION TOTAL				(1) to

TURN TO PAGE for a discussion of visual aid equipment.

FORM II-E-5

VISUAL-AID EQUIPMENT

Item	Recommended Quantity	Estimated Quantity Needed	Unit Cost	Total Cost
16mm. projector	1	X	(Range) to	(Range) to
8mm. projector	1	X	(Range) to	(Range) to
Filmstrip projector	1	X	(Range) to	(Range) to
Slide projector	1	X	(Range) to	(Range) to
Opaque projector	1	X	(Range) to	(Range) to
Tape recorder	1	X	(Range) to	(Range) to
35mm. camera	1	X	(Range) to	(Range) to
35mm. copy stand	1	X	(Range) to	(Range) to
Ditto machine	1	X	(Range) to	(Range) to
Mimeograph machine	1	X	(Range) to	(Range) to
Thermo-Fax	1	X	(Range) to	(Range) to
Xerox	1	X	(Range) to	(Range) to
Visual-Aid Total				(1)

TURN TO PAGE 239 for a discussion of teaching aids.

FORM II-E-6

TEACHING AIDS

Item	Recommended Quantity	Estimated Quantity Needed	Unit Cost	Total Cost
Chalkboard drafting machine	1 per drafting room	X	(Range) _____ to _____ = _____	(Range) _____ to _____
Paper cutter	1	X	(Range) _____ to _____ = _____	(Range) _____ to _____
Light table	1	X	(Range) _____ to _____ = _____	(Range) _____ to _____
Total Teaching Aids				(1) _____ to _____

TURN TO FORM II-E-7 to summarize total facilities costs.

FORM II-E-7

FACILITIES COST SUMMARY

Advanced Drafting Rooms

Estimated number of rooms: _____ (1A)
Total facilities cost per room
(FORM II-E-2A, line (4)) _____ to _____ (1B)
Total facilities cost for advanced drafting
rooms (line (1A) X line (1B)): _____ to _____ (1)

Beginning Drafting Rooms

Estimated number of rooms: _____ (2A)
Total facilities cost per room
(FORM II-E-2B, line (4)) _____ to _____ (2B)
Total facilities cost for beginning drafting
rooms (line (2A) X line (2B)): _____ to _____ (2)

Offices

Estimated number of offices
(Assume one per instructor): _____ (3A)
Total facilities cost per office
(FORM II-E-3, line (3)): _____ to _____ (3B)
Total facilities cost for office
(line (3A) X line (3B)): _____ (3)

Utility-Teacher Preparation Rooms

Estimated number of rooms: _____ (4A)
Total facilities cost per room
(FORM II-E-4, line (4)) _____ to _____ (4B)
Total teacher preparation room cost
(line (4A) X line (4B)): _____ to _____ (4)

Visual-Aid Equipment (FORM II-E-5, line (1)): _____ to _____ (5)

Teaching Aids (FORM II-E-6, line (1)): _____ to _____ (6)

TOTAL FACILITIES COST

===== to =====